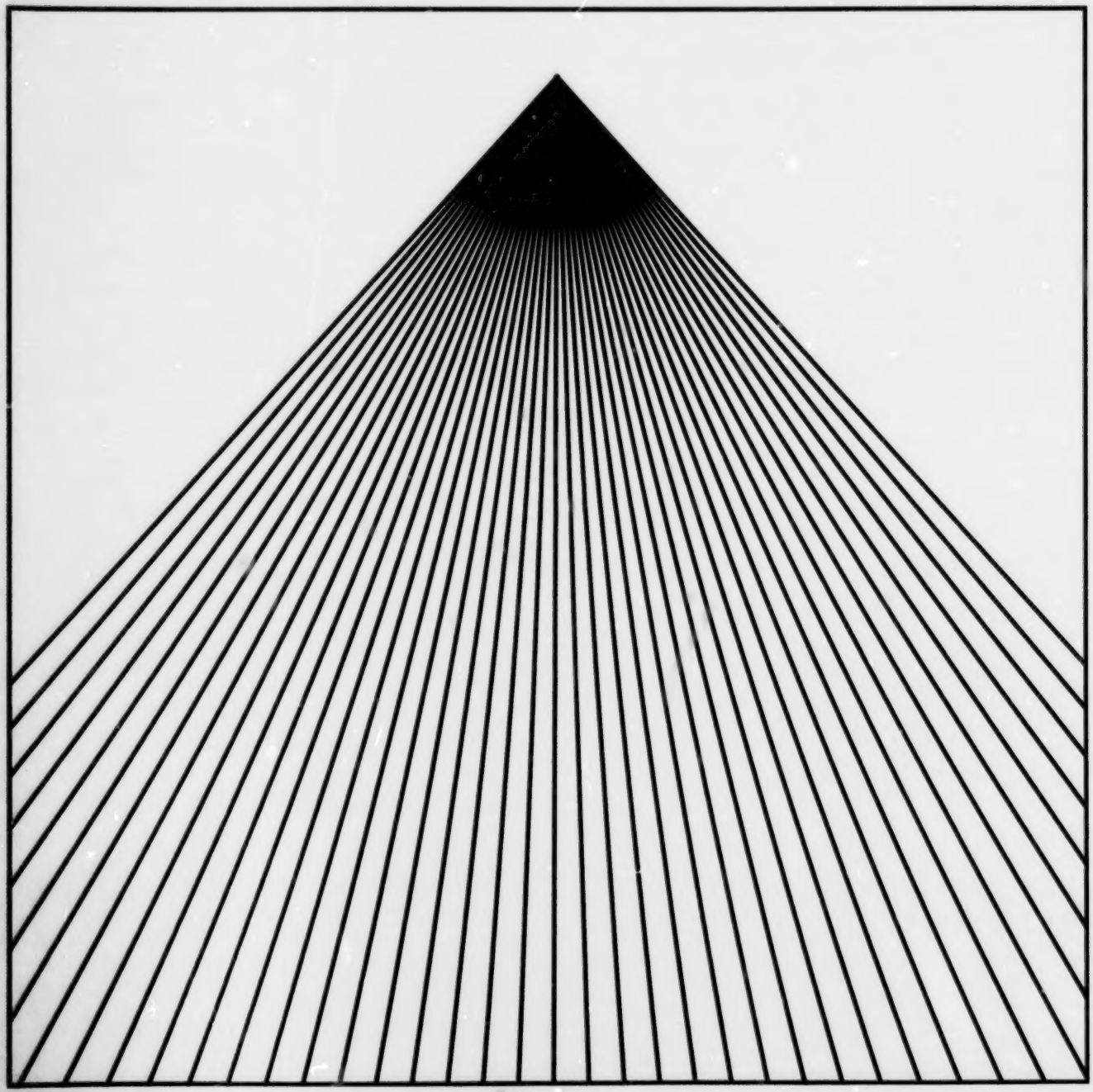
PERSPECTIVES ON DISTANCE EDUCATION



Alberta
EDUCATION

PERSPECTIVES ON DISTANCE EDUCATION

An Occasional Paper to Stimulate Thought and Discussion on the Future of Distance Education in Alberta

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PERSPECTIVES ON DISTANCE EDUCATION

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PERSPECTIVES ON DISTANCE EDUCATION

PREFACE

The economic times call for "Doing More With Less" and maintaining educational programs of excellence through the reallocation of resources. In improving access to educational opportunity, there is ample evidence that technology can be a valuable resource if it is managed in intelligent and appropriate ways.

The Alberta Government's Policy Statement on Secondary Education[1] mandates a number of directions for the future, among them a call for the provision of equitable opportunity:

> **The secondary education system must use technology to enhance learning and to facilitate access to equitable educational opportunities for all students regardless of ability, circumstance or location.**

This then, is the central purpose of this occasional paper produced by the Planning, Policy, and Research Secretariat of Alberta Education to mark the occasion of the International Symposium, "Distance Education By Design". Our intent is to stimulate discussion about distance education in Secondary Education and to evaluate carefully strategies that might be designed to cope with the increasing demand for correspondence education.

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EXECUTIVE SUMMARY

The high school graduate of the year 2000 will begin a future that is uncertain. The workplace will be very different from our present imaginings, and the needs, pressures and responsibilities of the year 2000 will call for new knowledge, skills and attitudes. There is however, one certainty: the graduate of the year 2000 has entered the school system already and will grow in response to the effectiveness of that system.

The Government of Alberta's Secondary Education Policy Statement encourages an imaginative review of present services and advocates the co-ordination of human and technological resources in meeting the diverse and changing needs of Albertans. The search for excellence in education is not new. Today, the challenge of "doing more with less" encourages the development of new and innovative approaches. The Information Age presents a bewildering array of technological options but there is evidence that technology, intelligently applied, can be of pivotal importance in the development of new systems. In the field of distance education, technology can play a vital role in the overall design of cost-effective delivery systems.

The growth in demand for learning opportunities at a distance is paralleled by the growing respectability of distance education as a flexible and effective part of the total range of educational programs. In an age when lifelong learning has emerged as a critical life-coping skill, independent learning takes on a new significance. The new philosophy is rooted in the reality that until something has been "learned" it has not been "taught" and that learners must take an increasing degree of responsibility for their own learning.

The research evidence is clear. Distance education is effective, it is cheaper than traditional forms of learning, and courses can be completed in less time than in conventional classrooms. Further, there is increasing support for the independence of learning styles, location, and time that are the hallmarks of distance education.

New teaching-learning strategies often make extensive use of educational technology and provide support to the individual in overcoming the "loneliness of the long-distance learner". Specialized design of course materials and delivery systems can provide new educational choices and improved opportunities for learning because the most effective techniques and materials can be integrated into a professionally designed program and quality is assured. A review of the technologies used to collapse distance and establish effective communication between teacher and learner indicates that careful planning is required to provide an optimum mix of human and technological resources. One-shot injections of a singular technology seldom work. Careful planning which encourages familiarity with new technologies in action can lead to effective implementation strategies which overcome the traditional slowness to change.

The needs assessment survey of administrators and students in Alberta showed strong preferences for courses in the core academic subjects and a serious educational motivation to obtain a credential. The most significant finding was the need to reduce turnaround time for marking of assignments. Students also expressed a strong desire for some form of local learning centre. There were indications that students prefer working on their own in an environment free from external constraints but do require regular interaction with a teacher throughout their courses. Administrators and students feel that the present quality of learning materials is quite satisfactory, although administrators feel that correspondence study is inferior to regular classroom instruction.

The literature review and needs assessment survey results lead to the identification of six critical issues that need to be addressed in the planning process:

1. Reduced turnaround time for assignments.

2. Improved course delivery and enhanced communication.

3. Improved student support services.

4. Development of systematic course design procedures.

5. Establishment of new partnerships between and among central, regional and local agencies.

6. Enhanced equity of access to educational opportunity, especially in small and remote schools.

These critical issues can be addressed by two broad approaches. It is possible to structure new systems on a centralized or a decentralized basis. For example, a number of different technologies can be used to reduce turnaround time between the learner and a centralized agency. On the other hand, technologies can also be programmed to provide local and regional networks in a decentralized approach. Since all six critical issues are interrelated, a solution for one may not be the solution for all. Careful planning of implementation projects designed to test various approaches is recommended.

Given a 50 percent increase in enrollment over the past three years at the Alberta Correspondence School, it is natural that new ways of developing and delivering distance education are being explored. This exploration must involve administrators and students in participatory planning for the future. This occasional paper is offered in this spirit as a means of encouraging informed dialogue on the issues. Whatever systems emerge, it is imperative that they make a difference for the children now entering school. These children will be the graduates of the year 2000 and the planning initiatives of today will determine how well they cope with their futures.

CHAPTER ONE

INTRODUCTION

Purpose

This publication is the result of a number of research initiatives conducted by the Planning, Policy and Research Secretariat of Alberta Education. A questionnaire survey of administrators and students in Alberta was designed to provide data on current and future needs of distance learners. A literature review was conducted and a number of other planning activities examined the role of technology in the future, specific needs of small schools and the concept of networking. These activities generated information on developments in distance education around the world and specific data on future needs in Alberta.

The purpose of this work may be summarized as follows:

- To provide information on developments in distance education as input to decision making.
- To survey the alternative technological systems available and evaluate their potential for use in Alberta.
- To assess the distance education needs of client groups, with special reference to support systems and co-operative relationships.
- To consider the background information and data in terms of issues for discussion and resolution prior to decision making, and to encourage the improvement of learning opportunities through distance education.

Context

Today's child entering kindergarten will graduate in the year 2000 to a very different world. The twenty-first century will bring unprecedented change and challenge, but will also offer unprecedented technological tools to assist in the tasks of education. Predicting the future is a hazardous exercise but in an age where today's science-fiction operates as tomorrow's science-fact, we must begin to shape that future. Increasingly, the future operates in the present tense and there is mounting concern about what the Club of Rome has called "The Human Gap" --- the accelerating pace of change and our limited ability to cope.(2)

The information age brings increasing social and technological change. Because the gap between discovery and widescale implementation is closing fast, it is imperative that we plan now for a future where technological change is

harnessed to humane purposes. The intelligent application of technology to the improvement of the human condition calls for an increased emphasis on technological literacy. This life-coping skill can be developed by learning with the technology as well as about technology. In this context, Alberta has initiated a number of reviews to ensure that technology is used in the more equitable delivery of educational opportunity.

The search for "instant panaceas" has frequently led to a single injection of a singular technology. Experience has shown that this additive approach seldom works. The systematic management of all resources in a cohesive plan for improvement is a preferred approach that promises to lead to long-term change. In planning for the effective integration of technology, we are conscious of the limitations of many of the technologies and the usual constraints to innovation and change.

The search for improved means of delivering distance education led to a review of current practice around the world and an assessment of the needs of Albertans for enhanced services. This publication is the result of this search and is designed to stimulate discussion and the development of improved educational opportunity.

Historical Background

Distance education in Alberta has evolved over the last sixty years and planning for the future must provide for a smooth transition from the past.

The Alberta Correspondence School (ACS) had its origins in the Annual Report of the Deputy Minister in 1923 which observed that, "a large number of families have located on the outskirts of settlements, and are too remote from their neighbours to make it possible for them to form a school district".(3) The initial experiment consisted of delivery by mail of Readers and instructions for parents. Written assignments were submitted to the Department of Education in Edmonton and returned with comments and additional lesson outlines. More than one hundred families applied for courses in this first year. By 1927, 250 new students enrolled in the basic subjects of reading, writing and arithmetic.

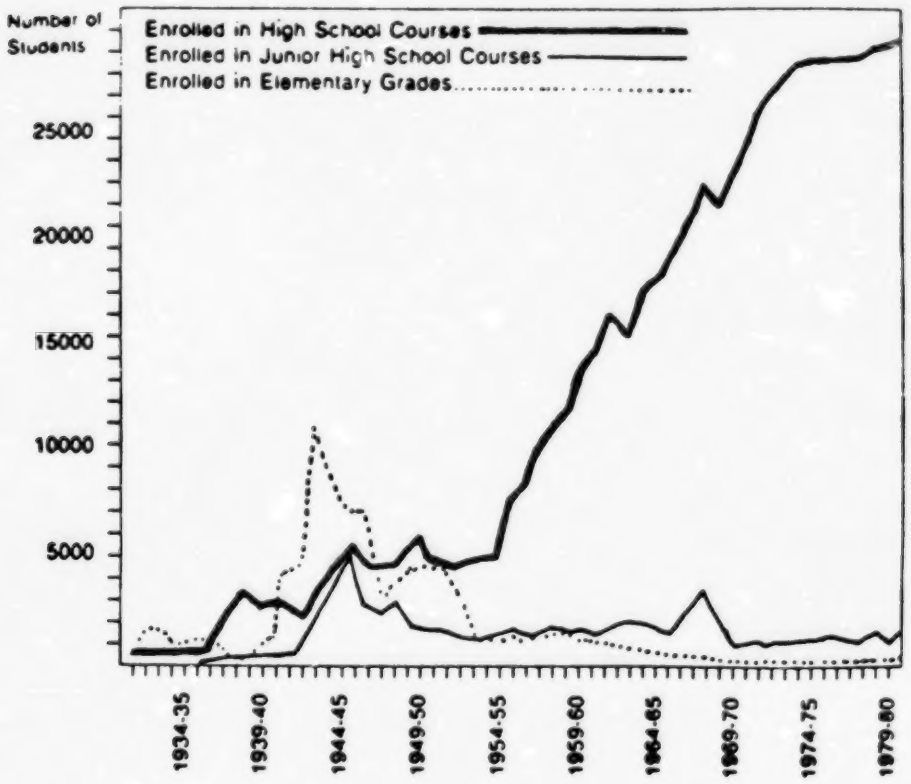
By the 1940's the Correspondence Branch had established a library, developed and distributed science kits to students, and embarked on its first radio broadcasts to teach French. By 1946 there were 673 local correspondence centres, many in rural schools that had been closed.

In 1956 the Legislature approved the position of travelling teacher to visit students in the Peace River country, particularly for High School courses where there was an explosion of demand.

From these early beginnings, the enrollment pattern has expanded dramatically as detailed in Figure 1:(4)

FIGURE 1:

ALBERTA CORRESPONDENCE SCHOOL ENROLLMENT (1932 - 1983)



After several reorganizations and re-locations, the Alberta Correspondence School continues to experience a significant growth in enrollment. Over the past three years enrollment has increased by almost 50 percent.(4)

TABLE #1: STUDENT AND COURSE ENROLLMENT

Year	Students	Courses
1982-83	26,838	41,908
1983-84	28,168	46,072
1984-85	32,801	51,701
1985-86	40,147	60,332

These students were enrolled in more than 60,000 individual courses and submitted 373,000 lessons for marking in the 1985-86 school year. About 60 percent of these courses were taken by adults. The current budget of the Alberta Correspondence School is about $8.5 million.

Today, the Alberta Correspondence School is an integral part of the educational system and makes available a full spectrum of courses to children at home and in school, and to adults who need to obtain a High School Diploma. Following some preliminary experience with a number of different technologies, the Alberta Correspondence School is vitally concerned with finding new ways of meeting the dramatic expansion of demand.

The Policy Perspective

The activities in policy development stem from the 1985 review of Education in Alberta which led to the promulgation of The Secondary Education In Alberta Policy Statement. This document charts the directions for change in creating excellence in our educational systems and is the framework for development in the immediate future. The Policy Statement identifies eight major principles, one of which mandates the improvement of educational opportunity through the use of technology:

Principle #6

The secondary education system must use technology to enhance learning and to facilitate access to equitable educational opportunities for all students, regardless of ability, circumstances or location.

In addition, the Policy Statement provides several other references that impinge on distance education:

- Students will master effective language and communication skills, including the ability to use communications technology.
- School jurisdictions should select the most suitable mode and place of learning for all secondary school programs.
- Besides facilitating distance education, new technologies may support greater individualization of some learning activities.
- In addition to assisting students with routine learning needs, distance education offers the potential for catering to the particular needs of students with special abilities or interests.
- In other areas, and for particular students, vocational education opportunities should be available in partnership with the community, and to the extent possible, through the use of communications technologies.

- While the content and objectives of courses are set, the secondary school program and administrators should encourage teachers to use appropriate teaching strategies and materials to accommodate individual learning styles and needs. Opportunities for continuous learning, individualized instruction, and other strategies, including summer schools, should be expanded at both the junior and senior high school levels.

- An assessment will be required of organizations that facilitate student learning through the application of technology. The assessment will determine whether current organizations and facilities, such as ACCESS, the Alberta Correspondence School, the Alberta Vocational Centres and Athabasca University, might deliver services more effectively through an integrated and comprehensive plan. The benefits of such a plan would include:

    - The remote or small rural school, limited in teacher personnel and/or resources, could use distance education to offer a broader choice of courses.

    - Smaller groups of individual students would be able to pursue courses more economically.

    - Distance education networks might alleviate the need to close schools and the negative effect this has on communities.

    - Distance education networks could be formed to link schools to share teaching and other resources.

- Program reviews should involve the study and application of new developments, knowledge, and methods of delivery.

With these policy directives firmly in place, Alberta Education has developed a Four Year Plan (1987-1990)[5] which sets out a number of priority initiatives in the field of technology. The following excerpt outlines the planning directions for technology and distance education:

Technology in Education and Distance Education

Alberta Education will encourage and support the use of appropriate cost-effective technologies to improve educational management and administration, classroom management, and instruction to improve student achievement.

Alberta Education will have:

- developed a plan for the role of technology in education to the year 2000

- implemented procedures and systems to encourage technological literacy, and integration of appropriate technology into all curricula

- implemented, in co-operation with stakeholders, a system for effective/efficient acquisition, production and distribution of educational software and courseware

- piloted the implementation of an electronic computer network between the Department and school jurisdictions to transfer information electronically, including student records and school finances

- implemented an office automation network in Alberta Education in which 80 percent of all clerical staff and 60 percent of all professional staff and managers use compatible microcomputers

- encouraged and supported other government departments, consortia, and the private sector to produce and market educational software appropriate to Alberta's needs

- implemented policies and procedures in co-operation with stakeholders, to ensure that technology and software in Alberta schools are systematically replaced, upgraded and maintained

- implemented an Electronic Information Processing plan for the efficient and effective co-ordination of internal computer activities, including the establishment of a unit to provide information and services in the use of educational technology to the school jurisdictions

Alberta Education through the Alberta Correspondence School will have:

- developed a number of core courses to be delivered via technology

- piloted systems to enable students to access Alberta Correspondence School courses using technology

- established procedures with various partners for the development, delivery and marketing of Alberta Correspondence School products and services

- expanded Alberta Correspondence School technology-based programs to rural areas, as appropriate

- developed and piloted challenge examinations to allow for differences in student situations and learning abilities

Summary

These are the major policy perspectives which direct the development of enhanced distance education systems. Collectively, they provide a firm base for the development of new approaches in partnership with the various groups involved in the delivery of education. These new partnerships may involve the expansion of distance learning, greater utilization of technology, and greater participation of the community in the teaching-learning process.

Policy directions may be summarized as follows:

- Distance education is seen as an integral part of the educational system with several cost-effective applications.
- The special needs of remote or small schools can be addressed, in part, through improved use of communications technology.
- An assessment of educational agencies that facilitate student learning through technology can lead to improved services.
- Individualized instruction should be encouraged and distance education can help small groups of students to study more economically.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Any image of the future must be developed with an understanding of the past and the present. Correspondence education is in transition and the central purpose of this literature review is to chart the directions for change and provide information for use in the planning process. By surveying the recent developments in distance education, background research data was incorporated into the design of survey instruments and used as information to assist in decision making. (See page 44)

A review of the literature provides evidence of an emerging philosophy of correspondence study. Essentially it is a philosophy of independent learning that is captured by the recent change of name in Ontario from "Correspondence School" to "Independent Learning Centre". Delling[6] has attempted to depict how the early growth of correspondence study can be traced to two different lines of development. One line is represented by self-study where learners in the last two centuries acquired information and knowledge from available literature. The second starts from correspondence between colleagues, friends, and experts in the field concerning the subject being learned.

The concept of two-way communication is the hallmark of the earliest roots of correspondence education. The first known reference in North America to correspondence education is the advertisement in 1728 by Caleb Philipps concerning instruction in shorthand.[7]

> n.b. Any Persons in the Country desiring to Learn this Art, may by having the several lessons sent Weekly to them, be as perfectly instructed as those that live in Boston.

Again, in England, two-way communication was a most essential element in the correspondence teaching started by Isaac Pitman in 1840. This event coincided with the introduction of uniform "penny postage".[8] These early developments exhibited three criteria which influence the evolution of correspondence education:[9]

i) two-way communication between student and teacher
ii) the communication is at a distance, not face to face
iii) the communication is by means of "stored information"

Correspondence education has not enjoyed a high status in the minds of educators working in the more traditional classroom environment. This attitude is illustrated in an early comment on the movement to establish "off-campus" programs at the University of Chicago:[10]

> Now correspondence courses may have their uses; and in a country where postage is cheap and superficiality rampant, they are likely to spring up; but that the prestige of the University of Chicago should be used to bamboozle well-meaning but untrained persons with the notion that they can thus receive a high school or college education is scandalous.

Times change, and correspondence education is now cited as one of the innovative means of improving education and making it more cost-effective.(11) The prevailing evidence is that students of correspondence courses achieve as well or better than their classroom counterparts.(12) (13) The evolution of correspondence education has been summarized by Eric Gough as follows:(14)

"access"

> We have seen three broad philosophies of distance education in Australia, with a fourth just emerging. The earliest of these could be called the philosophy of access. It assumed that if a student could attend classes on campus he should attend: distance education was only for the student who needed to acquire qualifications and who was too remote to attend class. . .

"equal opportunity"

> This philosophy of access was found wanting. It was now seen that an institution. . .had a responsibility to teach that student. . . . The student was provided with copious quantities of material: notes, articles, tapes of lectures, indeed anything that could be produced easily and could be sent economically to the student. In comparison with the dearth of material provided within the previous philosophy, it was a relative feast. But it was left to the student to introduce order into this abundance and to determine the relative value of the material. It was an improvement aimed at reducing the educational impoverishment under which the distance student had previously laboured. It was more than access, it was the philosophy of equal opportunity.

"equivalence"

> However, it was not long before people became more concerned with the notion of equality; that is, ensuring that the education received by the distance student was equivalent as far as possible to that enjoyed by his on-campus counterpart. The materials

became more structured, parallels with on-campus course requirements were more closely observed, attendance requirements were instituted, the same staff were used to teach on and off campus, and students continued to sit the same examinations. All of these were regarded as important if the qualification awarded the distance student was to be of the same standing as the qualification gained by the on-campus student... It was more than opportunity, it was equivalence...

"new philosophy"

Today, a new philosophy is emerging... Essentially it is the view that distance education is more than a matter of admission, materials, and assessment; and that it is more than an alternative mode of teaching, it is concerned with the complete learning experience of the student and recognizes that, in order to provide that experience, a whole educational sub-system is required.... It is a new philosophy.

Gough maintains that the new philosophy should not be constrained by the structures, timetable, and routines of traditional institutions; to do this results in inappropriate and unsatisfactory courses that do not meet the special needs of the distance learner. The new philosophy should:(14)

> look at the component parts of a distance education system to see that each is appropriately designed for its purpose and that the parts are properly articulated to make a coherent and logical whole. The emphasis is on providing students at a distance with a complete and well-balanced educational experience that caters properly for needs from pre-enrollment counselling to graduation.

Definitions

Old words assume new meanings with a new philosophy. A set of definitions will provide a framework for discussions of the "new" distance education.

Correspondence Education:

> Correspondence education refers to the teaching-learning process that occurs when information is exchanged in writing. It usually is found when geographical distance separates the learner and the teacher.(15)

There is increasing difficulty with thinking and operating with this narrow definition of "Correspondence". This is evidenced by the change in name of The International Council for Correspondence Education (ICCE) to The International Council for Distance Education (ICDE) in 1982. Holmberg[16] is an acknowledged authority in the field of distance education and characterizes this form of learning as "the absence of face-to-face communication". However, many distance education systems now incorporate tutorials, seminars, and residential laboratory experiences where face-to-face communication is provided. Increasingly, the new technologies provide for surrogate 'face-to-face' communication, so this definition lacks the orientation needed for the future.

Gough[14] has proposed a definition that recognizes the need for pre-produced course materials, allows for a focus on independent learning and time flexibility for the student, and acknowledges the requirement for an effective support system. This definition is suggested as appropriate for our purposes.

Distance Education:

> Distance education is a mode of teaching and learning which, for the most part, allows the student to choose the time, place and circumstances of learning. It requires the design, production and delivery of self-instructional materials and provision for student access to educational resources designed to support independent study.

In fleshing out this definition, Keegan[17] has undertaken an analysis of various definitions and proposes that the following key elements be present in any true system of distance education. Because they provide an excellent summary of recent developments, these key elements are reproduced here to serve as criteria for the evaluation of distance education organizations:

1. An extensive philosophical base.
2. An appropriate organizational structure.
3. Adequate resource allocation.
4. The use of specialized educational techniques in designing learning experiences, writing self-instructional materials, developing appropriate teaching strategies and providing adequate student access to learning resources.
5. Production processes that allow materials to be published in pedagogically sound and attractive format using audio, video and print as appropriate.
6. An efficient course 'delivery' system in its widest sense, including the development of an effective support system to meet the needs of students at a distance both before enrollment and as enrolled students.

7. Programs for staff training and development.

8. Evaluation and monitoring procedures to improve the system.

Educational Technology:

Gough[18] draws attention to "how much and how heavily distance education draws on educational technology". This view is endorsed by Bacsalmasi[19] who defines technology as "the inter-relationship of materials, energy sources, tools and systems for the organization of work or other purposeful human activities". The emphasis here is on the planning component of technology rather than on the discrete tools which may be used in the delivery of education. There is a common misconception that technology in education is simply an inventory of 'audiovisual aids'. The Technology In Education Committee of Alberta Education has recently adopted a definition of educational technology that emphasizes a management approach to planning of all resources:[20]

> Educational technology is the management of environments for effective learning through appropriate interactions among people, materials and machines.

This definition recognizes that the imperative of any technology is the planning component and avoids the limitations of a 'tool' approach to analyzing technological needs.

Within this broad definition of educational technology there is the emerging concept of learning systems. Kaye & Rumble[21] have studied the nature of learning systems and suggest the following key features of the course materials designed systematically as 'learning systems'.

- a flexibility in the curriculum and content of the learning materials through, for example, modular structures
- the conscious and systematic design of learning materials for independent study incorporating, for example, self assessment devices and the provision of feedback from students to learning system staff and vice versa
- the planned use of a wide range of media. . .suited to the needs of the students

Any use of the word "systems" often connotes a mechanistic, dehumanizing approach to education. This is as unfortunate as it is erroneous. There is ample evidence that a true systems approach can do much to improve the effectiveness of learning[11] and reduce the amount of time taken to learn a given amount of content.[22] [23] [24] These savings in time can amount to as much as 50 percent to 100 percent over standard classroom learning, with considerable advantage to both the learner and the educational system.

Because learning systems are vital to the effective design of course materials, the following definition is offered. It is the definition created by Alberta Education's Technology In Education Committee: [20]

Learning Systems:

> A Learning System is designed to create effective environments for learning. It provides strategies, materials, experiences and evaluation to ensure success.

These definitions are offered as aids to discussion of the issues and the adoption of a workable philosophy of distance education.

The Philosophical Perspective

The emerging philosophy of distance education is an amalgam of old and new educational concepts. Firmly rooted in the research findings of traditional education, it does however, draw upon the specialized bodies of knowledge in such fields as communications, lifelong learning, technology, and independent study.

> The so-called 'information revolution' driven by rapid advances in communication and computer technology, is profoundly affecting American education. It is changing the nature of what needs to be learned, who needs to learn it, who will provide it, and how it will be provided and paid for.

This finding of the Office of Technology Assessment[25] illustrates how technology is having a <u>transformational</u> effect upon all forms of learning; the transformation is most prominent in the development of alternatives to traditional approaches to education. Again, the philosophic trends outlined here represent a convergence of learning, teaching, technology and environment into a holistic perspective.

Another trend that impacts on the philosophy of distance education is the lifelong education movement. Driven by the burgeoning demand for continuing and further education, lifelong learning presupposes that the acquisition of a formal "once only" terminal credential is an insufficient preparation for an age where knowledge is increasingly disposable. The 1977 UNESCO study on education for the world of tomorrow summarized lifelong learning in this way:[26]

> Starting from the observation that today the amount of knowledge acquired in school no longer stands up against the wear and tear of time and is therefore insufficient for a whole lifetime, it must be supplemented and brought up to date after reaching adulthood. Retraining and adult education in their various forms have become indispensable. School education must be supplemented by other possibilities and other forms of learning and training. But if all these different educational processes are to be as effective as possible they must be co-ordinated and integrated in a single, comprehensive system: Lifelong Education.

In this context, the re-conceptualization of education to develop lifelong learners is driven by the changing needs of the workplace and the fact that in high technology fields, knowledge is obsoleting itself every three to five years. This leads to the following observation by Lindenau:[27]

> Given the reality of an economy shifting from manufacturing to information processing, the reality of a critical need for highly literate and technologically astute workers, the need for lifelong learning for non-traditional students, and the existing and emerging information technologies that have ushered in the Information Age, what has been education's response? All too often, it is and has been a case of too little, too late.

The Alberta Secondary Education Policy Statement recognizes that we must prepare students "to live in a highly complex and changing society" and "enable them to participate in and shape the future". The nature of the future has been probed by Naisbitt[28] who asserts that society is currently caught between the Industrial Age and the Information Age. Among the "megatrends" that he identifies are the following:

- Explosion of new technology and the production and distribution of knowledge.
- Increasingly human responses to technological innovation.
- Increasingly self-reliant people.

- More grassroots innovation.
- National economic systems changing to more global economic systems.
- Multiple options for people to make choices from.

These trends lead to a future where people need to train and retrain; to learn and re-learn. Again, the Secondary Education Policy Statement accepts the imperatives of developing "information retrieval and other related skills essential for independent and lifelong learning", and "to assume increasing responsibility for independent and continuous learning, and develop positive attitudes towards learning while in school, in preparation for self-directed, lifelong learning experiences".

This philosophical approach defines self-instruction in terms of open learning systems such as those advocated in the 1977 UNESCO publication "Open Learning".[29] In the last ten to fifteen years a large number of organizations have been established with an avowed mandate to offer 'open' learning opportunities. These range from the British Open University to Alberta's Athabasca University; from British Columbia's Open Learning Institute to a host of similar developments around the world. For an extensive overview, readers are referred to Kaye & Rumble's work.[21] For the present purpose, the following description indicates the broad directions of open learning and the needs they serve:[29]

> Such systems are designed to offer opportunities for part-time study, for learning at a distance and for innovations in the curriculum. They are intended to allow access to wider sections of the adult population, to enable students to compensate for lost opportunities in the past or to acquire new skills and qualifications for the future. Open learning systems aim to redress social or educational inequality and to offer opportunities not provided by conventional colleges and universities.

Such open learning institutions clearly draw on the concepts of lifelong and recurrent education which in turn respond to the simultaneous revolutions in information, technology and communications. Not surprisingly, open learning institutions often draw upon the technologies that are an integral part of social change to bring about educational change. In so doing they strive to offer educational opportunity in different ways, not simply to replicate "on-campus" courses. In this sense, the practice of open learning institutions is to develop new and different modes of delivery, teaching-learning styles, and operational procedures. The incorporation of technology has been a feature of conventional and open learning systems, but has had its most dramatic impact in the field of open learning.[25]

These new open learning institutions are wrestling with the difficulties of providing alternative means of delivery, often in times of serious fiscal restraint. Sims[30] draws an important distinction between "individualized learning" and

"independent learning" and points to the increasing use of electronic communication in distance education. The implications for design of correspondence courses are obvious: clarity, small easy-to-master steps, avoidance of error, and regular speedy feedback on progress made by the learner. Clearly, the major factor in design of materials is to recognize that the "loneliness of the long-distance learner" can be overcome by well designed materials that apply the principles of effective independent learning.

A synopsis of various philosophies of education leads to strong links with the concept of independent learning because in reality there has been no "teaching" until there has been "learning". Increasingly, there is a strong emphasis on manipulating the variables of learning to achieve optimum results. These 'conditions of learning' are of primary importance in constructing operational systems for learning, both in the institutional setting and in the field of distance education. Links to independent learning may be summarized from the works of the following educational philosophers:

1. The Philosophy of Education (John Dewey)
2. Psychology (Robert Gagne)
3. Behavioral Psychology (James MacDonald)
4. Psycho-Analytic Theory (Pauline Sears)
5. Socio-Anthropological Theory (Dorothy Lee)
6. Phenomenological Theory (Sidney Jourard)
7. Educational Technology (Gerald Gleason)
8. General Morality (James MacDonald)

Planning must draw upon an increasingly wide selection of traditional 'disciplines' in formulating answers to social problems. An effective philosophy of Distance Education should be eclectic and interdisciplinary.

Wedemeyer[31] has summarized the various forms of teaching-learning environments that comprise the field of independent study. Freedom from external pacing, development of maturity and autonomous learning skills, and convenience for the learner are all hallmarks of effective independent study programs. Under conditions of learning based on correspondence or distance delivery, students are inevitably forced to function in the independent learning mode.

Moore[32] has proposed a taxonomy of teaching and learning that is required by the "Copernican transfer of the centre of gravity in educational thinking and research from the preoccupation with functions and activities of teachers to the behaviours of learners". This shift of emphasis from "teaching" to "learning" is especially relevant to the field of distance education. Moore cautions against construing independent learners as "a kind of Robinson Crusoe cast away on an island of self-sufficiency... The independent student is engaged in an educational program, which by definition, implies both a learner and a teacher in a transactional relationship". Witkin[33], Knowles[34], and Rogers[35] have analyzed the psychological differentiation of 'field dependence-independence' in students enrolled in distance and independent learning programs. Differences in cognitive style and learning style have critical implications for the design of

instructional content and mode of learning. This analysis of learning styles can be combined with an analysis of the social and emotional characteristics of learners. For the purposes of this literature review it is sufficient to point out that learners move naturally to physical and psychological maturity and therefore to independence. Sometimes however, this maturation can be frustrated by schooling which freezes the learner into a pattern of dependence. A fully autonomous learner identifies a learning need when he finds a problem to be solved, a skill to be acquired or seeks information he does not have. There are several implications for further research and review of the literature in this important matter of learning styles and individual learner characteristics.

Where correspondence or other types of independent learning programs are well organized and freely available, independent learners will tend to self-select this mode. However, marketing of the concept could attract a larger audience for correspondence, particularly in areas currently under-represented in enrollment patterns. Reasons for participating in correspondence study include this desire for independent learning and have been summarized as follows by Harris and Williams: (36)

> Recent research suggests that the most important reasons, for the individual, relate to the independence of this form of study. The learner values the control over his/her pace of study, the time of commencing courses, the relative power to adjust a study programme and even its content, and to plan one's own study-work to suit one's many other adult duties and demands. The second group of reasons relates to the convenience of correspondence part-time study, the non-availability of suitable classes (or of any classes whatsoever), the attraction of avoiding tiresome travel to classes, the absence of places for group study and the possibility of some contact with teachers and fellow-learners even when scattered over a wide area. A third group of reasons, supporting the reasons above, arises from the individualist preferences of many adult learners. Many, though not all, men and women prefer the lesser competitive element, the absence of distracting social elements and the possibility of individual attention and help. Not all systems of "distance education" serve to meet equally all these reasons.

There is a great deal of ambiguity in the operation of correspondence institutions since they can provide both large-scale mass education programs, and cater to individualized study. Care must be taken to distinguish the difference between independent and individualized study; however, the similarities are greater than the differences, and a UNESCO Study(26) points out that:

> . . .in whatever society, for whatever purposes, by whatever means, under whatever ideology, the essential objective in the educating processes is learning by an individual learner. . .the methodologies or strategies employed are only incidental to this end.

Distance education caters to individual study; however, as the courses develop they can be used easily, and to great economic advantage, by large numbers of students as a form of mass communication. Holmberg[37] asserts that this 'industrial type of teaching and learning' allows for planning, rationalizing procedures, division of labour, mechanizing, automation, and controlling and checking. Peters[9] has made a systematic study of these methods and has compared them to industrial work.

Although correspondence study is primarily designed for independent study at a distance, the literature supports the contention that materials, once developed, might be of value in much broader contexts for use as individualized learning resources for in-school use. The increasing use of media components in the materials themselves and use of communications technologies in delivery of these materials may lead to enhanced cost-effectiveness within the traditional school system. This approach is not at all inconsistent with the spirit of the Secondary Education Policy Statement and more detailed recommendations in this area should be explored.

Research Findings In Correspondence Education

This section concentrates on those research findings regarding the development of distance education systems applicable to Alberta. Information presented here was used in the design of research instruments used in assessing needs.

The Students

Holmberg[37] cautions against regarding correspondence students as a homogeneous group. The prevailing age of adult students is increasing [38] and the largest cohort is in the age range 25-35. Generally, the research indicates a large predominance of male students with some indications that the number of females is increasing. Goorhuis[38] and Wangdahl[39] report an increasing number of female students in Holland and Sweden. However, in Alberta, Balay[40] reported in 1974 a sex distribution of approximately two females for every male student. Balay's survey found that the majority of ACS students was contained in the 16-17 age range.

Baath[41] asserts that correspondence study is by no means exclusively, nor predominantly, a phenomenon of sparsely populated areas. Increasingly, student demographics reflect overall demographics, with a higher proportion coming from urban areas.

Reasons for Taking Correspondence

Holmberg[37] cites the following research by McIntosh[42] and Glatter and Wedell: [43]

> McIntosh, 1976, and Glatter and Wedell, 1971, have shed some light on the reasons why students have chosen distance study instead of other types of adult education. The replies to a questionnaire sent to 20,000 students and answered by some 12,000 showed, according to Glatter and Wedell, that more than 70 percent chose correspondence study because it was felt easier than other study forms to facilitate the planning of the study programme chosen and to assess the progress made. The time factor came next as a reason given for the choice of study. More than 50 percent answered that they had chosen correspondence study because it makes 'it easier for you to work at your own pace than if you went to classes'. Almost the same percentage regarded going to classes as 'uneconomical of time'. More than a third of the respondents stated that they preferred studying on their own 'to studying in a class with other people'.

In a study of some 4,000 students in Europe Flinck[44] found that the three most important reasons for taking correspondence study were:

- The freedom offered to pace their study as they wanted to. (83%)
- The support provided in planning study and assessing progress. (73%)
- A predilection for individual work. (63%)

Reasons for taking correspondence indicate a strong and persistent correlation with a demand for independent study. Baath[41] reports that students are "goal-oriented" and that there is an increasing preference on the part of learners for correspondence study, even though similar traditional courses are available. In this respect, student preferences reflect the emerging philosophy outlined earlier. Moore[45] maintains that in the future, distance education will:

> reflect a growing commitment to the nature of idiosyncracy, creativity, and the maturing of every personality: to the development of autonomous learners.

Drop-out rates

Except in residential type systems found in Australia and for in-service training of professionals there is an almost universally high drop-out rate in correspondence study.[37] A 'drop-out' is defined as a student who commences a course and participates but does not complete; as opposed to a 'non-start' who registers but does not participate. Effective counselling before registration, and screening out of casually interested potential students, possibly by use of the fee structure, can minimize the number of non-starts. The question of non-starts and drop-outs is important to any overall consideration of cost-effectiveness.

Holmberg[37] feels that since many students use correspondence without declaring a formal educational goal, the high drop-out rate is to be expected because they are not seriously interested in finishing all assignments and taking the formal examination. It is debatable in these cases whether or not the informal learning is worthy of financial support. Once a casual student has learned that specific small piece of the whole program he requires, he 'drops out' and shows up in the statistics. Currently, there is some concern over the drop-out rate in traditional residential educational programs with the University of Alberta reporting a 10 percent per year drop-out rate and the University of Victoria reporting that only 50 percent of all first year students finally graduate. These figures are disputed because some students take time out for a year or two. On the other hand, some claim the true drop-out rate is as high as 70 percent.[46] The reason for confusion over true drop-out rates is the absence of any definitive time limits for completion, and lack of measurement for partial learning when final examinations are not completed. However, against this background of confusion, correspondence education is generally conceded to have a high drop-out rate. Baath[41] reports that "drop-out rates around 50 percent are not unusual" but that this rate is not much different from other forms of part-time, non-compulsory adult education. Reasons for the drop-out problem are cited as:

- Lack of serious interest to begin with.
- Difficulty with first few units of study.
- Lack of prior experience with correspondence study.
- Course took too long or student lost interest.

Women and older students tend to have higher completion rates and the following course-related factors can minimize drop-outs:[41]

- Short vocationally oriented courses have lower drop-out rates.
- Simple and inspiring course materials.
- Short turn-around time for assignments.
- Supplementary face-to-face contacts.
- Various forms of telephone communication.

When one considers the difficulties of part-time study, the higher than usual drop-out rate is not surprising. Baath[47] points out that the same flexibility of time that is part of the advantage of any independent learning and correspondence system is also part of the problem:

> ...a considerable number of the students that do not continue probably drop out without having attained their goals, in some cases presumably due to the lack of pacemaking devices in typical correspondence education.

Rekkedal[48] confirms that the free study rate is both the greatest advantage and disadvantage of correspondence education. Another factor is the total time taken to complete a course. Some reports[11] indicate that any given course can be completed by correspondence in about 70 percent of the time taken in traditional classroom study. Goodlad's survey[49] of 1,000 traditional classrooms reports that typically up to 30 percent of classroom time is lost to classroom management, discipline, etc., so effective net time on-task is similar, but total time taken in class is significantly longer. In general terms, a number of studies have found that students in correspondence courses do better than their in-school counterparts.[41] There is no question that the drop-out rate can be lowered in order to enhance the overall cost-effectiveness of this mode of learning, particularly if correspondence education is to be expanded as a delivery mode. It is important to note that correspondence education is already a highly cost-effective form of delivery with a cost range of 25 percent to 33 percent that of traditional delivery.[37] [41] Considerations of time and cost are important factors in assessing the true economic cost of the drop-out problem.

Simultaneous Two-way Communication As a Supplement

This section introduces the telephone, face-to-face communication, pacing and computer-assisted communication, as proven techniques for supporting the learner.

Telephone:

There is a growing tendency to use communications technology in support of distance education programs. Interactive satellite and telephone technology can provide instant two-way communication that gives immediate answers to questions, and the rapid growth of teleconferencing in industry and education indicates that this medium can be cost-effective.

Fransson & Thang[50] report very favourable student response to telephone tutoring in Sweden, and Athabasca University makes extensive use of tutoring by phone in its undergraduate program offerings. Usually, the student initiates the phone call in search of specific answers; however, Flinck[51] reports on a system where the tutor initiated the call to the student. Telephone-supported students performed better on final examinations than did those students without benefit of tutor-initiated phone support.

Ahlm & Baath[52] report that students greatly appreciated telephone support, especially in Mathematics where delay in correcting a wrong approach can have harmful effects on future learning of more advanced work. Ahlm[53] however, found that only 12 percent of students availed themselves of telephone access to their tutor. In general terms it appears that telephone support is more common in North America than in Europe.

Face-to-face:

Several distance education programs integrate live face-to-face sessions to handle field trips, laboratory work in Science, and to allow for group discussions in other subjects. Because the need for socialization is a significant motivation for pursuing adult education courses, it may be that this human contact can assist in course completion because of the interest generated. Baath[41] reports that when face-to-face meetings are compulsory, they are well attended, but when attendance is optional a far lower proportion of students avail themselves of this type of support. In several European countries courses are offered in two forms: one with face-to-face contact, and the other exclusively with correspondence materials. This practice allows for learners to choose their preferred mode of learning and recognizes that distance learners do not comprise a homogeneous group.

Wangdahl[54] conducted an extensive survey of research in Europe which indicates that it is important to plan for the right balance between autonomous learning and face-to-face support. Although the need for face-to-face discussion will vary from one subject to another, it is important to recognize that contact with the ideas of others in discussion can be an important part of the overall learning experience. A 1980 research report from Athabasca University,[55] although unable to determine whether face-to-face seminars attracted higher-performing students or that seminars contributed to higher performance, found that about one-third of students did attend.

In general, face-to-face contacts do lead to better achievement and a lower drop-out rate on the part of most students.

Pacing:

The ideal of independent study is to free the learner from any and all time constraints, and there has been criticism of the Open University's system of forcing students to synchronize their timetables with broadcast schedules.[37] However, there is some evidence that pacing can provide an external motivation for some students. An Athabasca University study[56] found that completion rates were substantially higher for paced package courses than for home study courses. The paced package courses were delivered by locally recruited instructors in a face-to-face mode and proved to have higher completion rates and lower costs than the home study courses. The study suggests that further research be undertaken to improve the nature of the home study courses. Holmberg[37] finds that the German Fernuniversitat and the Canadian University of Waterloo correspondence modes have very strict pacing requirements which treat the learners as members of a single class rather than independent learners. The impact of different pacing strategies on different types of learner is an area for further research.

Computer-Assisted Communication:

Peters[9] maintains that correspondence education is an industrialized process with systematic planning, considerable division of labour, mechanization of certain functions, and assembly-line principles. Computerization of repetitive administrative functions is almost universal in correspondence institutions. However, computerization of learning is not nearly as common and is somewhat more controversial.

Baath's study[41] found that in 20 statistical testings there were seven significant differences and six were in one and the same positive direction. Computer-assisted two-way communication was found to correlate with:

- a greater proportion of starters
- a greater proportion of completers
- more positive attitudes to the correction of assignments
- shorter overall study time

In both courses investigated it was apparently possible without any adverse effects whatsoever to replace the traditional two-way communication by computer-assisted tutoring. The computer-assisted two-way communication seems to have yielded better effects than the traditional ones in perseverance, attitudes, and gross study time.

These general findings are supported by a meta-analysis conducted in 1980 by Kulik, Kulik and Cohen[57] who found in fifty-four studies that fourteen had statistically significant differences. Thirteen of these favoured the computerized application rather than the conventional class. Further, in all eight of the studies which collected data on the amount of time spent on instruction, the computer produced a substantial saving of time spent on learning, about 25 percent on average.

Baath & Manson[58] report that students displayed a very favourable attitude towards computer managed feedback on correspondence assignments because:

- Legible computer-printed comments were preferred in contrast to handwritten ones.
- Detailed comments of 300 words from the computer versus 20-50 words from live faculty members were preferred.
- The computer was perceived not to get tired or angry.

Bates,[59] in a thoughtful inquiry into the future uses of computers in distance education, asserts:

> A computer-mediated communication system opens up a whole range of possibilities, including self-registration, fee-payment, and other administrative functions, as well as the more traditional computer education and computer-assisted learning. The main obstacle is not so much the technology nor even the costs, but the major organizational changes that will be necessary to introduce such systems.

The development of such feedback systems, given a course design model that incorporated self-check and computer marking, might have major impact on the effectiveness of learning and on overall costs of delivery. Bates summarizes as follows in a way that is consistent with the uses of technology envisaged in the Secondary Education Policy Statement:

> To develop such a system, a great deal more research and development is necessary. A massive programme of research into artificial intelligence and expert systems applied to education and training will be necessary, as will access to powerful machines by both courseware producers and learners. Highly skilled teams of programmers and educational specialists will need to be set up to create teaching materials and software which will emulate good teaching practice; a continuous, on-going system of curriculum development, and adaptation and up-dating of courseware and software, will be needed to take account of changing knowledge.

Melmed[11] supports this position and concludes that individualized software packages can lead to a transformation of education in the near future. He cites these potential advantages:

1) Empirical evidence confirms that experimental learning technologies will compete favourably with traditional classroom instruction.

2) Students learn faster in self-paced learning programs, often 50 percent to 100 percent faster.

3) Motivation is an important part of learning and self-paced or small-group learning can lead to higher achievement and greater retention.

Planning for the greater use of two-way communication, whether by phone, face-to-face contact, or by computer, is an area for further research. There is no question that the technological tools exist, but there is a strong need to devote more planning time to the management of all resources in a cost-effective system of distance education.

Course Design

Course Design is the process of managing the development, production and delivery of educational opportunity to learners at a distance. It is based on the systematic design of curriculum units in accordance with recognized principles of instructional design. The last decade has seen a dramatic increase in the number of distance education institutions in all parts of the world. Virtually, all have adopted a systematic model of course design based on meeting the specialized needs of distance learners. The course design process employs a team approach to developing units of study which reflect a wide variety of specialist input and an educational strategy designed to optimize the effectiveness of learning.

The most detailed model is that pioneered by the British Open University[60] and based on principles of educational technology. The Yearbook of Educational Technology[61] summarizes this emerging field and its practitioners in this way:

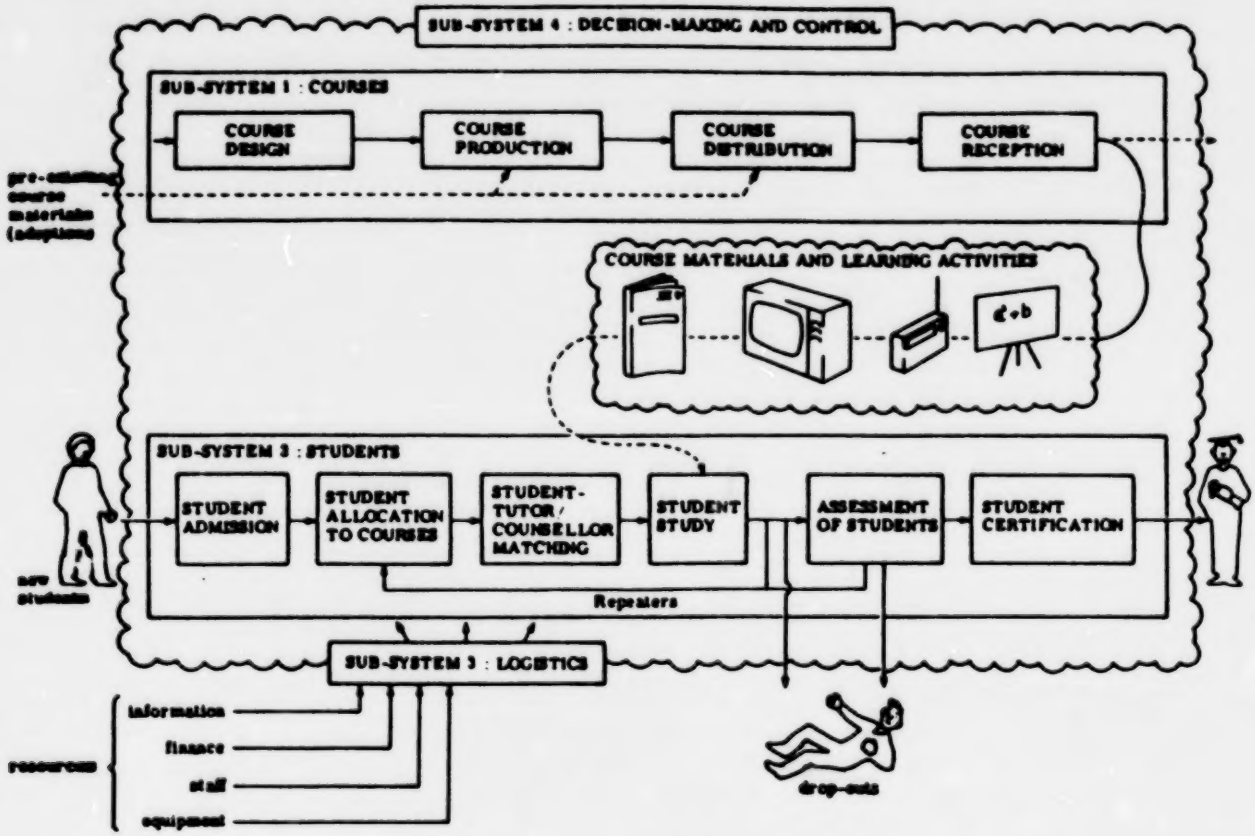
> A new breed of educator. We should not rely on engineers to become sufficiently acquainted with educational theory and practice to fill the role. Rather, education requires modern versions of the poly-technic men of the renaissance: generalists who know how to accomplish a broad range of specific objectives through the imaginative use of intelligently selected tools. For such men, the means may be technological, but the end is an artistic achievement. (Komoski) As a humanist and an engineer this neo-renaissance educator should make a major contribution to humanizing education through technology (Goshen) thus fulfilling Kenneth Richmond's prediction that 'educational technology' is destined to emerge as the central humane discipline of the future.

Operationally, educational technology provides for a systematic approach to the design and management of instruction. A systems view of distance learning is illustrated in Figure 2.[62]

The sub-systems suggested here allow for effective management of institutional effort to meet client needs:

Sub-system #1	Courses.
Sub-system #2	Students.
Sub-system #3	Logistics.
Sub-system #4	Decision-making & Control.

FIGURE 2: A SYSTEMS VIEW OF DISTANCE LEARNING



Because the needs of distant learners differ radically from the traditional classroom learner, and the variables available to create an effective environment for learning are so different, there is need for highly specialized skills in the management of distance education. Generally, the four sub-systems itemized here provide for:

- Opening of educational opportunity to new target populations not reached previously.
- Specific needs assessment for established and new target audiences.
- Instructional design that optimizes the development and delivery of course materials and services.
- Flexible, modular structure of materials and awarding of academic credit.

- Differentiated delivery systems to meet varying needs.
- Centralized high volume production of quality materials for large-scale use over a number of years.
- Co-operative use of facilities to meet the needs of learners.
- Appropriate use of technology in all four sub-systems.

The mounting volume of research into effective distance learning systems has led to a rapidly increasing sophistication of course design procedures and a more intensive concern with cost-effectiveness. It is apparent that course design is at the heart of the distance teaching-learning process and is of critical importance to the question of quality. After all, students spend the vast majority of their time with the materials that are the product of the course design process. Course design is therefore perhaps the critical variable in the field of correspondence education.

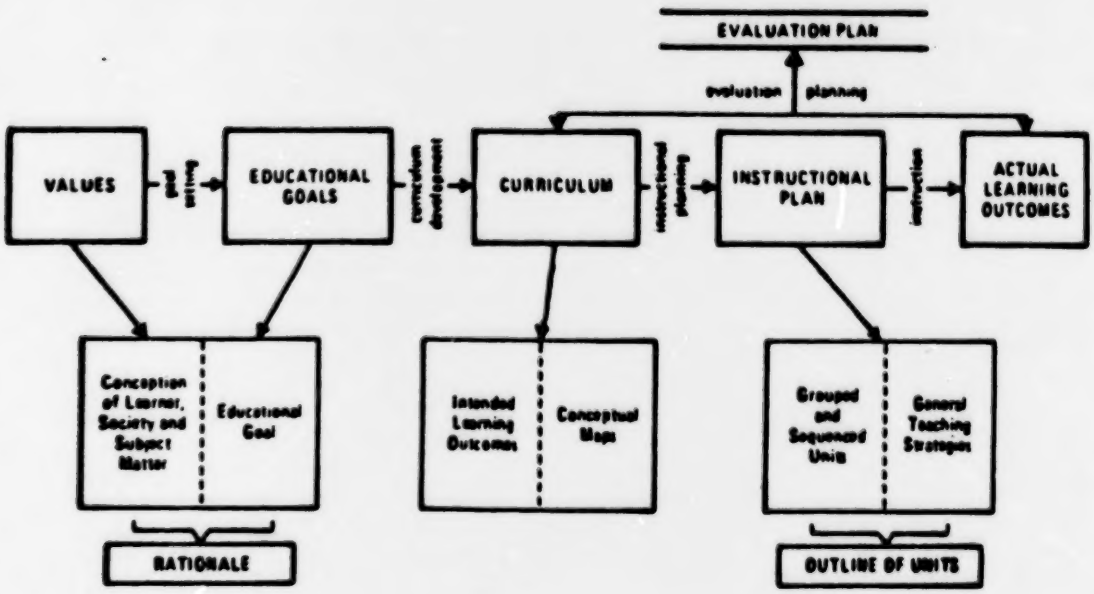
Within this broad framework there is considerable evidence that intensive development of learning materials can yield significant improvement of learning in terms of time spent and overall achievement. This process is more expensive and time-consuming than traditional delivery of classroom instruction. However, the economies of scale available through large enrollments and repeated use over several years without major modification offer the promise of significant cost-effectiveness. Potentially, units of study developed for distance education could have application to traditional classroom instruction and help create a more individualized approach to learning. If one of the goals of education is to develop autonomous learners with lifelong learning skills, there can be valuable opportunity for carefully designed units to be the basis for in-school learning. By experiencing a certain amount of independent learning, learners will be exposed to an environment where their skills of autonomous learning can be enhanced through direct experience.

Given the overall cost-effectiveness of distance education, there is ample opportunity to create course design teams and still remain competitive with the costs of traditional instruction.

Reallocation of funds may be necessary to ensure that students enjoy the benefits of a systematic course design procedure. Acquisition of materials developed elsewhere, or a consortium approach to development and production are sensible alternatives.

The components of course design may be outlined in the following way:(63)

FIGURE 3: COMPONENTS OF COURSE DESIGN



This model provides for a continuous revision and improvement cycle based on feedback from learners.

This systematic approach is designed to ensure the very best conditions for learning and to assist in devising strategies that meet the differing needs of different learners. More detailed applications of the learning systems approach have these essential steps:

1. Analyze content to identify types of learning required.

2. Identify entry behaviours, characteristics, and needs of learners.

3. Formulate performance objectives and criterion-referenced testing.

4. Prescribe instructional strategies and identify roles for teachers, learners, materials and machines.

5. Sequence learning objectives and content.

6. Sequence feedback to the learner before proceeding to next step.

7. Provide reinforcement and remedial sequences.

8. Design formative and summative evaluation.

9. Select teaching-learning styles and media for presentation.

10. Design the production, distribution and utilization strategies.

A learning system assumes the development and management of a number of highly specialized skills: communications, learning psychology, information retrieval, selection, acquisition and production of learning resources, assessment and evaluation. Above all there is a premium on systems design and a scientific approach to allocation of resources and management of the educational process.

The course design team requires expertise in the following areas:

- Subject matter experts with knowledge of the specific content covered in each course.

- Learning psychologists with specialized skills in the nature of learners and learning.

- Instructional designers with specific skills in bringing content and treatment together in the most effective ways.

- Evaluation specialists with knowledge of how scope and sequence of knowledge may be organized and tested to ensure mastery by the learner.

- Media specialists with expertise in the selection, acquisition, modification and production of learning resources and choice of delivery techniques.

- Project Managers with skills in managing people, products and processes, who ensure the educational and production integrity of the total course.

Some of this specialist expertise can be retained on a part-time basis and involvement may not be required for the total duration of each project. However, each of these skills needs to be available readily as required. It may be that one learning psychologist can work on two or three different courses while each course requires content experts on a full-time basis.

Since course design has such a major impact on the quality of the materials used by students for the vast majority of time spent learning, it is recommended that a specific emphasis be accorded this activity in any implementation of new systems.

Summary of Literature Review

The literature review revealed a number of recent developments in the field of distance education.

The following generalizations can be summarized from the research:

- Distance education is an emerging field of study with its own distinctive philosophy based, in large part, on known approaches to independent learning.
- Systematic use of technology can assist in reaching the distance learner and provide for instant two-way communication.
- New approaches to course design and the development of learning systems that enhance the quality of learning at a distance are a high priority.
- Distance education can be highly effective in terms of achievement, retention, and time spent.
- Drop-out rates can be reduced by careful attention to design of systems based on research findings.
- Distance education is cost-effective and may result in improved learning materials and strategies for use in a traditional classroom setting.
- Distance education encourages growth of the essential skills of autonomous and lifelong learning.
- Student support systems are critical to overall effectiveness of learning systems.

This is a fast-changing field and many areas of research are at a preliminary and tentative stage.

CHAPTER THREE

OVERVIEW OF TECHNOLOGIES

Introduction

This chapter outlines the major technologies that are applicable to distance education. The literature review helped to identify individual technologies for study, and provided a context for assessing their usefulness.

According to Moore, distance education is "the family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours".(64) The notion of distance between the learner and the teaching institution is crucial to the concept of distance education. However, as Law and Sissons(65) indicate, such distance is not necessarily geographical:

> ... the learner can be distant even in face-to-face learning situations if the program's structure is unrevealed, unclear, or not open to negotiation and if there is no inbuilt opportunity for dialogue with the educator.

As a result of the distance between the learner and the teaching institution, communications media are indispensable. Since the inception of modern distance education institutions, print has been the dominant medium of communication. It is not likely that the pre-eminent role of print will be diminished in the immediate future. However, developments in modern communication technology are such that a distance education institution now has access to a wide range of tools with which it can establish dialogue with its students.

The Major Technologies

Computer Assisted Instruction/Computer Managed Learning

Early interest in the use of the computer as an instructional and management device began in the 1960's with the development of the IBM 1500 system and the PLATO project at the University of Illinois. Both of these initiatives had a strong influence on the development of computer assisted instructional models. Computer Assisted Instruction (CAI) refers to the use of the computer as an interactive device where the computer presents material, then analyzes and acts on the responses of an individual student.

CAI materials are often classified as tutorial, drill and practice or simulation. In the tutorial mode, following presentation and student responses, the computer responds with either further elaboration or advancement in the curriculum. In the drill and practice mode, a problem is presented and the student responds. The computer then gives either positive or negative

reinforcement. In the case of wrong responses, the computer often provides some form of remediation and a return to the problem. Computer programs can offer a fixed number of problems or the author can program a sequence that repeats content until mastery is achieved. A simulation explores situations which cannot be experienced directly by the student. For example, a medical simulation might explore what to do in a cardiac arrest situation or a Social Studies class might explore management of a country's economy.

In Computer Managed Learning (CML) the computer is used to keep track of a student's position in a set of learning exercises or modules. A typical CML system has the following components:

1. test item banking
2. test generation and marking
3. course prescription and management
4. record keeping and courseware monitoring

Experience at the Southern Alberta Institute of Technology (SAIT) in the 1970's focussed on development of CML systems in Emergency Medical Technician Ambulance Training and Power Engineering. Use of the SAIT/Calgary Board of Education Mathematics 10-20 material and the use of Telidon to deliver certain components of Mechanics 12 has shown that the costs of development and telecommunication over long distances can be prohibitively costly. Recent technological developments have led to microcomputer power that rivals earlier mainframe computers with reduced costs of delivery; however, the substantial course development costs remain.

Computer Conferencing and Electronic Mail

Unlike use of the computer in CAI or CML applications, computer conferencing is an alternative means of reaching out to students at a distance.

Computer conferencing has been used extensively in the fields of commerce, higher education, and research. Commercial information services such as Compuserve and The Source have hosted international computer conferences for the past six years.

Increasingly, educational institutions are becoming aware of the potential of computer conferencing. As Harasim[66] states in a recent article:

> the use of computer conferencing systems introduces a new dimension of group (learner-learner-instructor) interaction into computer-mediated learning. Computer conferencing systems can facilitate a group learning environment which can in large part simulate the educational community that occurs on-campus, without such access restrictions as geographic location, scheduling and availability of classes, travel time, and cost.

In Australia, a number of distance education institutions are making extensive use of telecommunications facilities, including computer conferencing, electronic mail, and teletext. Hammond[67] indicates that telecommunication systems are being used to overcome the deficiencies of the postal service, to keep students up-to-date with current assignment requirements and changes in course content, and for the transmission of text which has been word-processed. Conferencing systems are being used to simulate face-to-face classroom discussions and to enable teachers to participate in professional development activities. For example, in 1985, at a conference organized by Simon Fraser University, a group of teachers in Sydney participated in an electronic conference using the LOGO computer language.

Computer conferences generally attempt to copy features of traditional face-to-face conferences; they have an agenda, they encourage participation, and they provide mechanisms for interaction and feedback.

Simpson[68] has indicated a broad range of possibilities stemming from the use of computer conferences, including; direct instruction in a number of courses; the provision of instructional support to both teachers and students; teaching a new basic skill -- information processing via computer; accessing information via on-line databases; and allowing peer-to-peer discussions among students.

A related use of computer technology is electronic mail. This use of computers has had a long history and is well established in a number of locations. School jurisdictions and Alberta Education are experimenting with electronic mail, so the technology is demonstrating its usefulness in previously paper-bound institutions.

The major disadvantages of computer conferencing and electronic mail may be summarized as follows:

- Many of the students would not be able to use computers for communications, either because they do not have easy access to computers, or because they do not have sufficient experience in using computers.

- The costs of long-distance charges for telecommunications would be substantial if conferencing and messaging were extensively used on a province-wide basis.

- Research conducted by the Open University has indicated that students and their families are reluctant to tie up the home telephone for extended periods of time, which would be the case if telecommunications services were initiated. This situation is exacerbated in some rural areas in the province, since extensive use of a modem would tie up party lines, inconveniencing a number of users.

Computerized Marking

Computerized marking systems, employing optical character reading technology, are available in a wide range of capabilities, from inexpensive versions running on an Apple microcomputer to fairly expensive systems which not only mark the student assignments but also provide feedback based on particular student responses. Shoemaker and St. John[69] describe the use of optical scanning technology to assess both the performance of students and the validity of placement tests at the University of California. The system they describe would, with some modifications, be useful in distance education, as it would allow the instructor to track student or class progress throughout a course.

Computerized marking could be viewed as the first step in the development of a system for tracking student progress through various courses. The marking system could be expanded to provide instructors with information about student progress, to compare student achievement on a particular assignment, and to detect areas of student difficulty. The system also could be employed to validate the reliability of assignment questions. Eventually, computerized marking systems could be merged with a full-scale computer managed learning system which would track student activities, assignments, and achievement throughout a student's program of studies.

Broadcast Radio

Radio has a long history of use in distance education, particularly in Australia and some of the developing nations. In North America, virtually everyone has easy access to a radio set; however, the airwaves are almost exclusively reserved for privately-operated entertainment programming. Inconvenient scheduling in early morning or late evening for educational programming has led to limited use of radio which can be a cheap form of mass distribution.

In Alberta, distance education institutions have the services of a province-wide AM/FM radio network at their disposal. ACCESS Radio CKUA is capable of reaching approximately 87 percent of the population, and the network has a clear educational mandate as well as a considerable body of expertise in the production of educational radio programming. (ACCESS is the Alberta crown agency for production, acquisition and distribution of educational media programming).

A second area worthy of investigation is SCMO (Subsidiary Communication Multiplex Operation). SCMO essentially "piggybacks" an encoded signal on the existing FM signal. Through the use of a low-cost decoding device, end-users are able to listen to the SCMO signal. ACCESS Radio CKUA is equipped for SCMO broadcasting, and several experiments with the medium, including the transmission of computer data were conducted several years ago. When combined with the use of the telephone, SCMO could provide two-way interactive capabilities.

Audiocassettes

Audiocassettes have been the medium most responsible for the declining use of radio. In Britain, the Open University has estimated that 90 percent of the students have access to audiocassette equipment. Similar, if not higher, rates of access or ownership can be expected in Alberta.

In Ontario, Waterloo University has made extensive use of audiocassettes to distribute lectures and to record instructors' critiques of student assignments.(70) In 1982, a joint project by the Corporation for Public Broadcasting and the Annenberg School of Communication funded a demonstration to enhance the quality of university correspondence courses through radio and audiocassettes.(71)

Although they lack broadcast radio's potential for interactivity, audiocassettes share most of radio's benefits while possessing several important advantages. Meacham and Butler(72) indicate that when used as part of a well-designed learning system, audiocassettes offer significant advantages:

- the cassettes are cheap and capable of high-speed duplication
- communication can be personalized
- dialogue can be naturally presented; pacing and inflection may enhance communication and emphasis
- audio cassettes can complement visual or written material
- cassettes can be used in a variety of physical situations, including those in which a student is otherwise occupied (e.g., while driving an automobile)
- essentially oral content is best communicated in its original form
- audio is a preferred mode of instruction by some students

A large variety of audiocassette materials already exists allowing distance education institutions to acquire materials, rather than producing them in-house. In addition, production is relatively simple and inexpensive, allowing course materials to be updated easily.

Broadcast Television

Over the past thirty years television has demonstrated that it can be used as a mass medium of formal education and instruction. It has used master teachers where there were shortages and has revolutionized education in developing nations such as India. Consortia like the Agency for Instructional Television have produced excellent educational series utilizing the best educational design and content experts. Research and development phases are very expensive and experience suggests there are no short cuts. Probably the most powerful mass-medium ever developed, television has immense power to motivate, illustrate and educate. However, because of its high production cost, most recent applications have been in the enrichment category rather than the strictly educational mode in a credit-granting context. Most advances in the formal education category have been by telecourses in the adult education sector.

There is no question that television can be used in the teaching-learning process and that its high front-end costs can be amortized over large audiences and a number of years. However, given current realities it is not likely that broadcast television will play a large role in correspondence education in Alberta. There are some indications that regular viewing schedules assist students in disciplining themselves when studying at a distance. However, the imperatives of scheduling and the continuing thirst for fresh new programming to attract broadcast sized audiences militate against its persistent use over many years in meeting formal education client needs.

Rapid growth in the use of videocassettes and the promising developments in interactive videodisc programs for education seem to hold more promise.

One recent development enjoying significant popularity in educational circles in the United States is the use of differentiated program channels made possible by Instructional Television Fixed Service (ITFS). This low-power form of broadcast can allow up to four channels to speak to four distinct audiences --- several of them having highly specific educational needs. This type of "narrowcasting", although cheap in technological terms, still involves heavy research and development costs. Evidence to date is that educators have not seen fit to allocate funds from teachers to television and that State Educational Television Agencies are not being weaned away from their predilection for large audiences.

Increasingly, costs of television production dictate an international consortium approach to educational programming. It is unlikely that, given the current climate, broadcast television will have a role to play in correspondence education at the school level. Relatively low enrollments suggest that a high per-capita cost for use of broadcast television in formal education will force educators to use alternative means of reaching their students. This is becoming ever more feasible in economic terms through media, or combinations of media, that are more "user friendly".

Satellite Technology

The emergence of satellite technology in the broadcast of entertainment and information has had a major impact in North America. Canada's active involvement with the development of the ANIK series of satellites places it as a world leader in satellite technology. The development of this technology has offered educators a new means of reaching students at a distance.

The principal advantage of satellite communication is the point-to-multipoint broadcast nature of the technology which is distance independent. Capital cost of satellite sending and receiving equipment and the high lease cost of satellite channels has generally excluded use of this technology for small audiences.

At present, the high cost of operation and one-way video have largely limited the use of the ACCESS NETWORK satellite in education to telecourse applications. Fortunately, the emergence of a new technology called VSAT (Very Small Aperture Terminal) will reduce these restrictions markedly. It has been known for some time that excess channel capacity exists on a satellite bandwidth beyond that required for video programming. In early 1980, a number of companies began to market small "data only" dishes which received data transmissions mixed with the video signal. More recently, Microtel, in conjunction with the Federal Department of Communications is in the process of manufacturing two-way data VSAT's for approximately $15,000 per unit. It is expected that more than 1,000 of these VSAT dishes could share the satellite channel with the existing network service. Soon to follow are two-way audio/data VSAT links which offer considerable potential for education at remote sites.

One other application of the satellite in distance education is the use of the existing network in the "off-hours" to broadcast video programs. The planned service called "Night-Owl" is intended to have a part-scheduled and part-requested offering. Since most schools and individuals have VCR's which can be set to tape programs in the early morning hours, this initiative would eliminate much of the need for physical transference of tapes. Although non-interactive, this application, in conjunction with more effective student feedback capabilities, could extend the use of media in traditional correspondence education.

Videotape and Videodisc Formats

Just as audiocassettes overcome many of the scheduling limitations of radio broadcast, videotape and videodisc formats allow the use of television in a non-broadcast manner.

The latest research indicates that VCR's are found in approximately 47 percent of Canadian households. Alberta is particularly well-equipped with videotape recorders, both in the home and in schools, where virtually every school in the province has at least one videocassette machine.

Increasingly, videotape is establishing itself as a primary medium for instruction. Programming can be controlled by the user in terms of selection, timing and pacing. It is often cheaper to produce materials for videocassette distribution than for broadcast. Once provincial rights for duplication of acquired programming are obtained, copies can be made for mass distribution. Last year ACCESS dubbed about 75,000 copies of educational programs for distribution.

Videodisc, while still a video medium, provides a number of additional benefits. The recording medium is long-lasting and of higher quality than videotape. Still pictures can be frozen indefinitely, and features such as frame advance and slow motion are of much higher resolution than those available on home VCR's. From an instructional viewpoint, the chief advantage of the videodisc is that it has truly phenomenal storage capacity in still-frame or motion formats. Instant access to any frame can be achieved and there is a growing array of programming strategies that allow for powerful educational applications.

Videodisc technology is being used extensively for industrial and military training and upgrading. However, its adoption by educational institutions is considerably slower because of the high level of expertise and associated costs required to design and produce first-rate videodisc programs. To date, most videodiscs are playback-only units, a major disadvantage when compared to the local recording capability of most VCR's. However, a number of recordable videodisc formats are under development.

Because videodiscs can be programmed to allow for branching, reinforcement and inbuilt testing, they emulate many of the characteristics of computer-based learning. As the number of players available for use in education increases, this medium may emerge as a powerful tool for distance education.

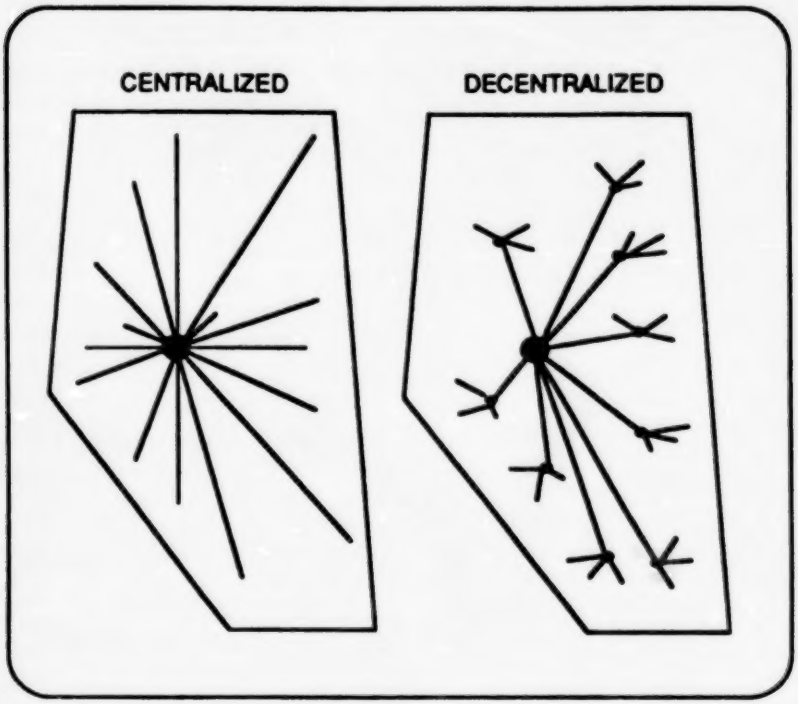
Audio Teleconferencing

The extensive telephone infrastructure in Canada has made the use of audio telecommunications technology practicable for educational purposes. To meet the needs of education, the usual point-to-point telephone conversations must be modified to point-to-multipoint communications with the addition of a teleconferencing "bridge". In this way, an instructor can be connected to a number of students and sites in distant locations. The most prevalent technological configuration at the student site is the use of a low-cost convenor as a combination microphone and speaker.

Alberta is a major user of teleconferencing for delivery of post-secondary credit and non-credit courses. The University of Calgary, SAIT, and Athabasca University have acquired equipment and there is a well-established infrastructure of learning centres across the province.

Initial developments used a central originating point and many remote centres. However, given the high cost of long distance charges and the increasing number of students, recent developments have involved decentralization of teleconferencing in a distributed network.

FIGURE 4: AUDIO TELECONFERENCING



Use of the toll-free RITE government network is a key factor in the growth of teleconferencing. Establishment of a Foreign Exchange (FX) Network among the five educational consortia in Alberta has allowed interconnection of mini-bridges and leased lines in a cost-effective way.

As a result of initiatives taken by the University of Calgary in the late 1970's, Alberta is now undeniably a North American leader in teleconferencing applications in distance education. In 1980, the University of Calgary acquired a 20 port teleconferencing bridge to link together a number of learning centres across the province to educational programming. The enormous success of this project encouraged SAIT and Athabasca University to emulate the University of Calgary model with the acquisition of similar equipment.

While audio teleconferencing offers the advantage of live two-way educational interaction, it has been constrained by a lack of visual capacity. Although experimental one-way satellite video with two-way audio has been tried, the cost-benefit of this delivery mode remains questionable. The lack of visual capability has been overcome recently with the addition of telewriter technology.

Telewriter technology typically involves the addition of a microcomputer with graphics capability, a graphics tablet and a modem that splits the telephone line into audio and data channels. The addition of this technology to the teleconferencing system provides two-way transmission of graphics information. The cost-benefit advantage of this approach is evidenced by the purchase of 25 telewriting systems in the Province in the past year. It appears that the combination of teleconference and telewriting technology now offers a cost-effective approach to meeting distance education needs in Alberta.

Telephone Tutoring

Telephone tutoring involves the use of technology to provide motivation, coaching and sometimes instructional support for students at a distance. Athabasca University is a major user of this approach in all of its program offerings. In the University's approach, a tutor is assigned to groups of 30 students in a given course. It is expected that students will call their tutors within prescribed hours throughout the week and that tutors will contact each active student at least once every three weeks. Although a major role of the telephone tutor is to provide a human component to the distance delivery materials and break down the isolation that distance students often experience, the tutor also plays a major role in the evaluation of assignments and student progress. Although telephone tutoring is an effective support mechanism in distance delivery, it has the disadvantages of time-dependent contacts with the tutor, significant long distance charges if it is used on a province-wide basis, and high labour costs.

Facsimile Technology

Facsimile is one of the technologies gaining increased acceptance in the business community. These machines, capable of transmitting text and graphics images over regular telephone lines, now sell in the range of $2,500 to $10,000. With an average transmission time of approximately 15 to 25 seconds/page and costs of roughly $.10 to $.15/page plus the long distance charges, this technology would appear to have potential for application to distance education. Although the primary means for delivery of the lesson material might remain via Canada Post, many of the tests associated with the student lessons could be marked and returned using facsimile technology, thereby significantly reducing the turnaround time problem. Although this application appears to hold great promise, it has the disadvantage of transmitting only a graphic image of the data. If further processing or computer analysis is required the data must be re-entered incurring additional labour costs.

Summary and Conclusions

Increasingly, there is a convergence of technology and distance education. This overview provides a brief glimpse of some of the major technologies being employed in the improvement of educational opportunity. Although technological capability outstrips our ability to incorporate it effectively, there are some notes of caution:

- Technology is not an instant panacea to be applied as a one-shot solution to a specific problem. Rather, it should be a carefully designed approach to the management of all resources --- human and technological.

- Change happens slowly in education and it is imperative that people are comfortable with the technology before it is implemented. Specific strategies to encourage adoption of new systems should be part of any planning strategy.

- Limited experimentation can yield important field experience and develop effective change strategies prior to widescale implementation.

- In planning for technological systems, care should be taken not to confuse "means" with "ends".

- In allocating resources for future developments, a balance between technological and human resources should be established.

CHAPTER FOUR

NEEDS ASSESSMENT SURVEY RESULTS

Introduction

The information obtained from the Literature Review and the Overview of Technologies was used to devise the questionnaires for the Alberta needs assessment. Four individual questionnaires were designed to gather information from Superintendents, Principals, In-School Students, and Adult Students. Samples were selected at random and stratified to represent an 80 percent rural and 20 percent urban stratification. Although this proportion is vastly different from the actual demographics in Alberta of approximately 70 percent urban and 30 percent rural, there was a deliberate attempt to emphasize the importance of rural responses. Detailed methodology and research results are available in the report, "Basic Learning At A Distance: Building New Partnerships".(73)

A 7-point rating scale was selected to measure most responses with "1" representing the low end of this scale. Most tables rank order the responses and indicate the mean score.

Overall response rates are indicated in Table 2:

TABLE 2: OVERALL RESPONSE RATE

QUESTIONNAIRE	MAILED	RETURNED	RESPONSE RATE
SUPERINTENDENTS:	20	17	85%
PRINCIPALS:	100	69	69%
IN-SCHOOL STUDENTS:	400	237	59%
ADULT STUDENTS:	600	307	51%
TOTALS:	**1,120**	**630**	**56%**

Status Of Correspondence Education

Superintendents and Principals were asked to rate the degree of status they thought existed in the minds of a number of key groups. Several reports from other surveys indicate that there is often a very low perception of status for correspondence education and this question sought to determine the judgements of Alberta Administrators on this important question. The degree of status attributed to the various groups was comparatively high, with both Superintendents and Principals attributing a much higher degree of status in the minds of students and parents than in the minds of employers and teachers. Because of the importance of opinions of teachers and employers it may be advisable to undertake further research directly with these two groups. Alternatively, a marketing approach might be used to educate these groups about the values of the correspondence mode. It is interesting to note that Superintendents judged that Principals had a significantly lower perception of the status of correspondence study than did Principals themselves.

TABLE 3: STATUS OF CORRESPONDENCE EDUCATION

IN YOUR JUDGEMENT, WHAT DEGREE OF STATUS DOES CORRESPONDENCE STUDY HAVE IN THE MINDS OF THE FOLLOWING GROUPS?	SUPERINTENDENTS (n=17) Rank	Mean	PRINCIPALS (n=69) Rank	Mean
STUDENTS	2	(4.0)	1	(4.8)
PARENTS	1	(4.1)	2	(4.0)
PRINCIPALS	6	(3.6)	3	(4.0)
SUPERINTENDENTS	4	(3.8)	4	(3.9)
PUBLIC	3	(4.0)	5	(3.8)
EMPLOYERS	5	(3.7)	6	(3.7)
TEACHERS	7	(3.2)	7	(3.5)
AVERAGE		(3.7)		(3.9)

Rating scale = Very Low 1 2 3 4 5 6 7 Very High

Quality Of Correspondence Study

Superintendents and Principals were asked to rate the degree of quality of a number of characteristics of correspondence study. Scores of 5.0 or better on a 7-point scale indicate a favourable assessment of the work done by the Alberta Correspondence School, especially in the areas of course content and the lesson materials themselves. Administrators rated their school library services quite highly, but their assessment of the overall comparison with classroom learning was quite low. Administrators rated the quality of feedback on assignments more highly than telephone assistance from the Alberta Correspondence School. It is interesting to note that Superintendents' ratings were slightly higher than those of Principals.

TABLE 4: QUALITY OF CORRESPONDENCE STUDY

PLEASE RATE THE DEGREE OF QUALITY YOU ATTRIBUTE TO THESE CHARACTERISTICS OF CORRESPONDENCE STUDY.	SUPERINTENDENTS Rank	Mean	PRINCIPALS Rank	Mean
COURSE CONTENT	2	(4.9)	1	(5.2)
LESSON MATERIALS	3	(4.8)	2	(5.0)
SCHOOL LIBRARY	1	(5.0)	3	(4.3)
FEEDBACK ON ASSIGNMENTS	4	(4.6)	4	(4.0)
OVERALL LEARNING EXPERIENCE	6	(3.9)	5	(3.8)
PHONE ASSISTANCE - ACS	5	(4.2)	6	(3.7)
AVERAGE		(4.3)		(4.1)

Rating scale = Very Low 1 2 3 4 5 6 7 Very High

In a separate question asking respondents to rate the quality of correspondence study in comparison to classroom study, both Superintendents and Principals rated correspondence fairly low. Scores of 3.2 and 3.0 on the 7-point scale were recorded.

Subject Preference Rankings

All four groups were asked to rate their demand for specific subjects over the next three years. There was a high degree of consistency between adult and in-school student rankings as illustrated in the table. In-school students tended to rate Computer Literacy higher than did adult students, and both groups tended to prefer the academic subjects as compared to Industrial Education, Fine Arts and Home Economics which received universally low rankings. Superintendents rated Second Languages far more highly than did the other three groups and Principals felt that Personal Development would be in much higher demand than did the other three groups. Students generally ranked Language Arts much higher than Administrators, and Administrators ranked Social Sciences much higher than did students. Further investigation of subject preferences might be undertaken since the future demand for courses has a significant bearing on future directions for the Alberta Correspondence School.

TABLE 5: SUBJECT PREFERENCE RANKINGS

PLEASE RATE THE DEMAND OVER THE NEXT THREE YEARS FOR THESE HIGH SCHOOL COURSES.	SUPT. Rank	PRINC. Rank	IN-SCH. Rank	ADULT Rank
MATHEMATICS	2	2	1	1
BUSINESS EDUCATION	4	6	2	2
COMPUTER LITERACY	8	9	6	3
SCIENCE	5	4	3	4
LANGUAGE ARTS	9	7	4	5
SOCIAL STUDIES	6	5	5	6
PERSONAL DEVELOPMENT	7	1	7	7
SOCIAL SCIENCES	3	3	9	8
2nd LANGUAGES	1	8	8	9
INDUSTRIAL EDUCATION	11	11	10	10
FINE ARTS	10	10	11	11
HOME ECONOMICS	12	12	12	12

Rating scale = Very Low 1 2 3 4 5 6 7 Very High

Mean response scores dropped from 4.4 at the top of the rankings to 1.9 at the bottom.

Methods Of Improvement

All four groups were asked to rate the importance of a number of ways of improving correspondence study. Both in-school and adult student respondents indicated a high consistency in their support for quicker feedback and study centres. Telephone access to ACS teachers and teleconferencing also drew strong support. Increasing the number of written assignments was not rated highly by students, and Administrators tended not to support this method either. Although computer programs as a delivery mode did not rate highly in the final rankings, it is interesting to note that 22% of in-school students and 22.6% of adult students rated this either a '6' or '7' on the 7-point scale. Again, 22% of in-school and 25.6% of adult students rated more television and media materials as '6' or '7', although the overall rankings were low. Generally, the respondents do not support the use of pre-produced materials, possibly because they have not experienced them in use.

Careful analysis of the individual responses indicates that mean responses can be misleading because they conceal significant concentrations at opposite ends of the scale. This indicates the importance of recognizing that correspondence students do not form a homogeneous group and that policies need to recognize that there is some justification for diversity in services. Further analysis of learner preferences should be an integral part of any new course design procedure.

TABLE 6: METHODS OF IMPROVEMENT

THIS IS A LIST OF METHODS WHICH HAVE BEEN SUGGESTED AS WAYS OF IMPROVING CORRESPONDENCE STUDY.	SUPT. Rank	PRINC. Rank	IN-SCH. Rank	ADULT Rank
QUICK FEEDBACK	1	1	1	1
STUDY CENTRES	3	4	2	2
PHONE ACS TEACHER	2	2	4	3
TELECONFERENCING	5	3	3	4
AUDIOTAPED LESSONS	8	7	5	5
MORE TV & MEDIA	4	5	6	6
COMPUTER PROGRAMS	6	6	7	7
MORE WRITTEN ASSIGNMENTS	7	8	8	8

Rating scale = Very Low 1 2 3 4 5 6 7 Very High

Reasons For Taking Correspondence Courses

In-school and adult students were asked to select their reasons for taking correspondence.

Table 7 illustrates responses from both adult and in-school students who expressed a very high preference for "working on my own" and "working at my own speed". In-school students rated working at their own speed particularly highly (5.9). Both groups rated as moderately high getting credits more quickly through working harder than in normal classes. Neither group felt that correspondence was less work than taking regular classroom lessons although there is substantial support for this statement in the literature. Generally there was support for the statement that correspondence courses are "better organized than classes". Again, strategic marketing of this information to students may enhance their feelings of confidence in correspondence study and have advantageous effects on persistence and achievement. Although 40% of the in-school students rated "they don't offer the courses I want in School" as a '1' on the 7-point scale, 26.4% did rate it as a '7'. This significant minority may be clustered in specific smaller schools and have a major bearing on policy development for small rural high schools.

TABLE 7: REASONS FOR TAKING CORRESPONDENCE COURSES

I AM TAKING CORRESPONDENCE LESSONS BECAUSE:	IN-SCHOOL Rank	IN-SCHOOL Mean	ADULT Rank	ADULT Mean
I like working on my own.	2	(4.6)	1	(5.5)
I like working at my own speed.	1	(5.9)	2	(5.0)
I like to work harder than normal and get my credits more quickly.	4	(4.2)	3	(4.4)
Correspondence courses are better organized than classes.	3	(4.3)	4	(4.3)
They don't offer the courses I want in school.	5	(3.5)	5	(2.9)
Correspondence is less work than taking classroom lessons.	6	(2.8)	6	(2.6)

Rating scale = Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Adult Student Reasons for Taking Correspondence

Adult students were asked additional questions about their reasons for taking correspondence. The major reason for adult students taking correspondence was to obtain further education leading to a qualification. The motivation to obtain a Grade XII Diploma or improve on previous marks ranked third and fifth. Collectively, these responses indicate a serious academic intent on the part of adults. Paradoxically, the second-ranked reason was "I just want to learn something about the subject". Students who work and can't attend classes ranked fourth with a mean response of 4.5 on the 7-point scale. Lack of alternative courses in the community is not a major reason and few adults used correspondence to assist with courses elsewhere. Clearly, the responses indicate that adults have strong needs for core academic courses.

TABLE 8:
ADULT STUDENT REASONS FOR TAKING CORRESPONDENCE

I AM TAKING CORRESPONDENCE LESSONS BECAUSE:	ADULT Rank	Mean
I need the courses to go on to further education to get a qualification.	1	(5.6)
I just want to learn something about the subject.	2	(5.0)
I want to finish my Grade 12 Diploma.	3	(4.6)
I work and can't attend classes.	4	(4.5)
I want to improve my Grade 12 mark.	5	(4.0)
I don't want to go to the regular school.	6	(3.9)
There is no other available course in my community.	7	(2.9)
It helps me with courses I am taking elsewhere.	8	(2.9)

Rating scale = Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Opinions About Correspondence Education

In-school and adult students were asked to express their opinion on a number of positive and negative statements in regard to correspondence education. No attempt is made here to rank the responses because the items test a number of issues revealed by the literature review and cannot be classified except as individual items. Both groups feel that you have to be "dedicated" in order to learn by correspondence and this fact might be featured in future marketing of correspondence courses. Students perceive the ACS courses to be relatively high in "excellence" and tend not to find them "dull and boring". Taken together, these two items show a slightly more positive attitude among adult students. Both groups feel a moderate need for discussing the course with other students, but do not rate "hearing the views of other people" very highly. There is no strong feeling that correspondence takes less time, despite indications of this in the literature review.

TABLE 9: OPINIONS ABOUT CORRESPONDENCE EDUCATION

PLEASE THINK ABOUT EACH STATEMENT AND INDICATE HOW STRONGLY YOU AGREE OR DISAGREE	IN-SCHOOL MEAN	ADULT MEAN
You have to be very dedicated to learn by correspondence because no-one drives you to do the work.	5.6	5.6
The Correspondence lessons are excellent.	4.7	5.2
I'd like to be able to talk to other students about the course more often.	4.3	4.1
Correspondence takes about three-quarters of the time taken by regular classes.	4.0	3.9
Correspondence study is very lonely.	3.5	3.1
There aren't enough pictures and diagrams in the lessons.	3.2	2.9
You can't learn much by correspondence because you don't hear the views of other people.	3.1	2.8
It's much easier to get credit by correspondence.	3.4	2.9
Correspondence lessons are dull and boring.	3.3	2.4
Correspondence is a really poor alternative to taking regular classes.	2.8	2.1

Rating scale = Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Neither group of students believe that correspondence study is easier, and this confirms the findings of the question asked in regard to reasons for taking correspondence. Again, there are indications in the literature that correspondence study can be easier under certain circumstances. Students do not feel strongly that "there aren't enough pictures and diagrams in the lesson materials".

Environmental Factors

Environmental factors are defined as those resources in the school or community that impinge upon the effectiveness of correspondence education. Students were asked to indicate availability of a number of facilities and services.

There is a relatively high degree of satisfaction with the availability of library facilities in schools and communities. About a third of all students find services to be non-existent or inadequate and there are strong indications that this group may be located in the more remote areas of the province.

The literature reveals the desirability of having active discussions with others in selected affective areas of the curriculum, and this led to the questions on the availability of other students and/or teachers with whom correspondence students might interact. In general, the in-school students reported having other students and teachers with whom they could interact; however, adult students reported a much less positive response to these questions. Again there are implications for design of overall delivery to adult students. Technology might be used to provide a number of interactive discussion components for those students who cannot benefit from face-to-face communication. 71.8% of in-school students report easy access to a telephone during school hours. Only 57.5% of in-school students report access to audiotape and videotape playback facilities which seems to indicate that some form of local study centre might be an important means of delivering those components of courses which utilize these technologies. While 65.9% of in-school students report access to a computer laboratory, a mere 19.5% of adult students have access. If utilization of computer software is to increase, there are some medium and long term implications for provision of these basic facilities. In almost all cases adult students report far fewer facilities than do the in-school students.

TABLE #10: ENVIRONMENTAL FACTORS

AT SCHOOL I HAVE. (In-School) IN MY COMMUNITY I HAVE. (Adult)	IN-SCHOOL YES	IN-SCHOOL NO	ADULT YES	ADULT NO
A good library with most of the books I need for correspondence study.	69%	31%	71%	29%
Other students taking the same correspondence courses I am taking.	51%	49%	22%	78%
Other students taking different correspondence courses.	87%	13%	50%	50%
Teachers I can talk to about problems with my course.	81%	19%	53%	47%
Access to a telephone during school hours to phone the teacher at ACS.	72%	28%	__ n/a __	
Good facilities to listen to audiotapes and watch videotapes if they are part of the course.	58%	42%	45%	55%
Access to a computer laboratory.	66%	34%	19%	81%
Other resource persons I can talk to about problems with my course.	__ n/a __		48%	52%

Summary And Conclusions

The overall impression is of a high degree of satisfaction with current services. There are clear indications of major differences between in-school and adult students with consequent implications for future planning. Increasingly, deficiencies in critical areas call for a diversified approach which can meet these different needs and circumstances.

The questionnaire results justify the following generalizations:

- By far the most significant finding is the strength of feeling about the need to improve turnaround time for marking assignments.

- Study centres are the second ranked priority for students and a very high priority for administrators.

- Superintendents and Principals, though reasonably satisfied with the quality of materials, still regard the quality of correspondence study as inferior when compared to classroom study.

- Administrators and Students clearly feel that future demand will be for core academic subjects. Correspondence is a serious and legitimate branch of the overall academic enterprise.

- Administrators rank highly the availability of phone contact with the teacher. Students rate this even more highly.

- Students like working on their own and at their own speed and are motivated to obtain a Grade XII Diploma.

- Students do not feel that correspondence study is easier than classroom study, despite contrary indications in the literature. They feel you have to be dedicated and self-directed.

Overall, there is need for further research beyond this preliminary needs assessment. However, the research findings provide a firm base for planning of enhanced opportunities for independent study at a distance. In general terms the findings support the directions set out in the Secondary Education Policy Statement. The next chapter blends the findings of the literature review and the needs assessment survey into an integrated analysis of the critical issues.

CHAPTER FIVE

THE ISSUES

Introduction

The literature review assisted in framing the needs assessment questionnaires, which in turn led to study of the technologies from a new perspective. These three inputs led to the identification of six critical issues:

1. **Reduced turnaround time:** both the needs assessment and the literature review indicate that reduced lesson turnaround time is one of the major factors in improving the quality of distance learning.

2. **Course delivery:** this issue is composed of three dimensions: first; the inadequacy of the postal service as the primary means of student interaction with the instructor; second, the use of a variety of technologies as instructional resources; and third, the use of technology to enhance communication between students and instructors as well as among students.

3. **Student support services:** the student needs assessment surveys identify the establishment of study centres as the second-most important need. Such study centres can provide multi-media library resources, counselling, tutoring, and pacing mechanisms necessary for effective distance learning.

4. **Course design:** distance education, because of the separation of the learner and the instructor, requires well-designed learning materials which maximize the effectiveness of independent study. This is a crucial component of any distance learning system.

5. **Partnership:** consistent with the relationship established between the Department and the school jurisdictions in the Management and Finance Plan, local jurisdictions can be made equal partners in the delivery of instruction and support to distance learners.

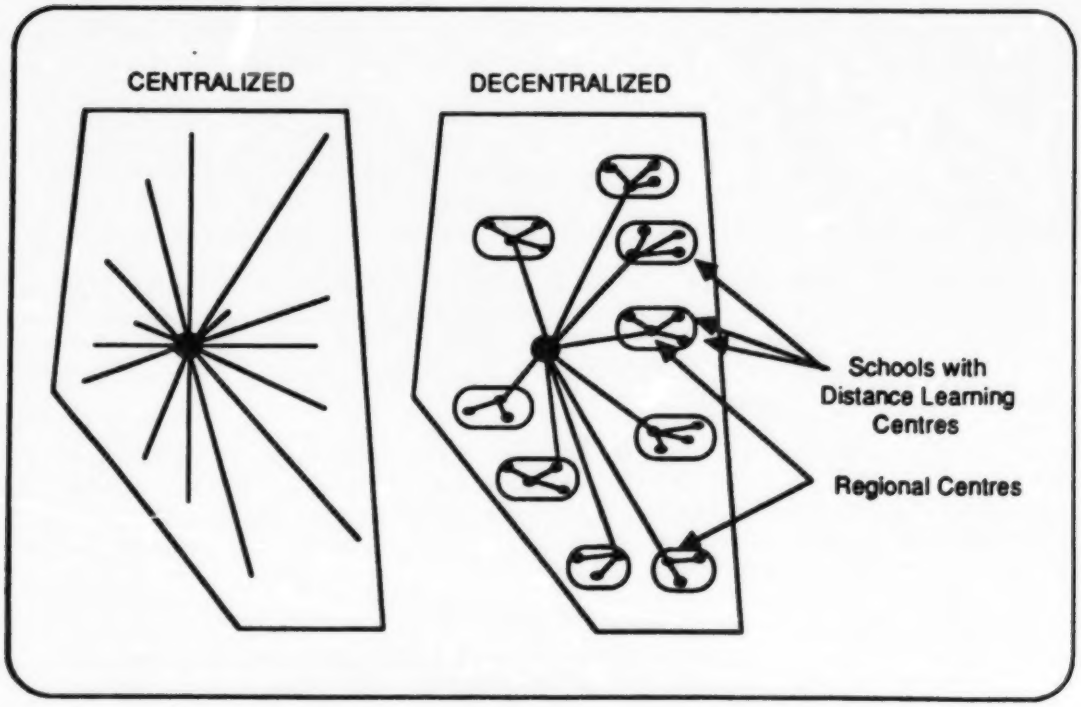
6. **Equity:** appropriately configured distance education facilities can allow schools to continue to offer the range of programs needed in all regions of the province. This issue is of particular importance to maintaining equitable educational opportunity in small or remote schools in the province.

Some of these issues can be resolved through the intelligent application of technology, for example, turnaround time can be improved by a number of technological means. Other issues are primarily management issues and call for careful development of new plans in co-operation with a number of stakeholders. In considering these issues, there emerged a realization that there were basically two structural approaches that could be conceptualized. It seems imperative that any future plans proceed from a clear grasp of the philosophical and conceptual bases for the two structural approaches.

Two Structural Alternatives

A consideration of the alternative approaches can be categorized as "Centralized" and "Decentralized".

FIGURE 5: CENTRALIZED/DECENTRALIZED MODELS



In the centralized model, services would be directed from the central provincial agency and technology would be used to connect all learners with one central point for virtually all materials and services.

The decentralized model envisages an active role for each school through the establishment of a distance learning centre with a wide range of locally based equipment, services and support systems. Each of these local centres might be linked to a Regional Distance Delivery Centre which would co-ordinate instruction, support and marking, and provide for a cost-effective mix of instructional programs to meet regional and local needs. Technology would be used to create communication networks between and among the regional and local centres. This model reflects the approach taken by the Open University which has established thirteen regions to co-ordinate a network of 260 local learning centres.

The Centralized Model

The consideration of a centralized approach was based on how well it could respond to the six critical issues. In the needs assessment, both the in-school and the adult students identified the reduction of turnaround time and the provision of study centres as the two major needs associated with correspondence study.

Lesson turnaround time has three components: the time required for the student to complete a particular lesson; the time required by the instructor to mark the lesson and provide feedback; and the time required for two-way transmission of the lesson between the student and the teacher.

A number of technologies could be used to speed transmission from the student to ACS and from ACS to the student. Facsimile, electronic mail, and two-way satellite technology all hold the promise of dramatically reducing the time required to transmit lessons. However, if ACS is to remain a centralized service, the costs associated with equipping large numbers of students with the required equipment is prohibitive. In addition, the line charges involved with centralized telecommunications would be very high, as was found to be the case with the ACS Telidon field trial in 1981-1982.

In addition to line charges and equipment costs, interactive technologies pose a major scheduling problem in a centralized model. With a student population of more than 40,000, it becomes very difficult to provide services such as teleconferencing and computer managed learning. In 1986, ACS attempted to host teleconferences for Accounting 10 students. Out of 2,000 invited students, only sixteen participated in the teleconference session.

In a centralized model, the only practical means for reducing turnaround time once a student has completed a lesson is electronic marking. ACS is currently using this technology to a limited extent, but the hardware and software being used appear inadequate to permit significant reductions in marking time. However, the use of more capable equipment, and the connection of that equipment to the ACS student database, would provide greater efficiency.

While it is important to reduce the lesson transmission time, it is also important to motivate students to complete lessons more rapidly. This involves two separate dimensions: pacing mechanisms, and course design. Perry[74] has indicated that:

> correspondence study is characterized by a very large student drop-out rate, and I am convinced that one reason for this is that many people lack the drive and dedication to maintain their work over a long period of time without an enforced pacing mechanism.

For reasons mentioned earlier, the ACS will find it difficult and costly to employ modern technology such as teleconferencing or electronic mail to provide centralized pacing and tutorial support. Course design, on the other hand, holds significant promise for improvement, because the pacing mechanisms can be built into the course materials. Additionally, if the courses are well-designed and attractively produced, they will motivate students to complete their work more quickly.

Course design is a vital ACS function, and one of the few that can be performed most efficiently in a centralized model. However, given the dramatic changes in techniques for delivering education at a distance, course design procedures should be reviewed.

If ACS is to broaden its offerings of learning materials to embrace the newer technologies, a major effort will have to be made to enhance the school's ability to design and develop learning systems. Aside from improving ACS production facilities, expertise will be needed in the area of Learning Systems Design to ensure that the expensive non-print components play a vital and effective part in student learning. Technology could assist in the implementation of learning systems by supporting course developers. For example, course designers should have access to a broad range of word and graphics-processing systems which could directly "drive" phototype-setters.

The centralized approach can work reasonably well for **correspondence education.** However, as the literature review indicates, students are increasingly demanding **distance learning.** A considerable body of research suggests that the students' perception of lack of interactivity and control is an important factor in the low completion rates found in virtually all correspondence education institutions. Zigerell[75] proposes a distinction between correspondence education and distance education based on interactivity and control:

> modern distance education, as opposed to traditional correspondence education, presupposes opportunities for student interaction, whether live or mediated, as well as for student independence.

If ACS chooses to retain a centralized approach, a major emphasis should be placed on improving the design and development of courses. Additionally, the marking process should be shortened through the acquisition of sophisticated electronic marking equipment, and the linking of this equipment to the existing student database.

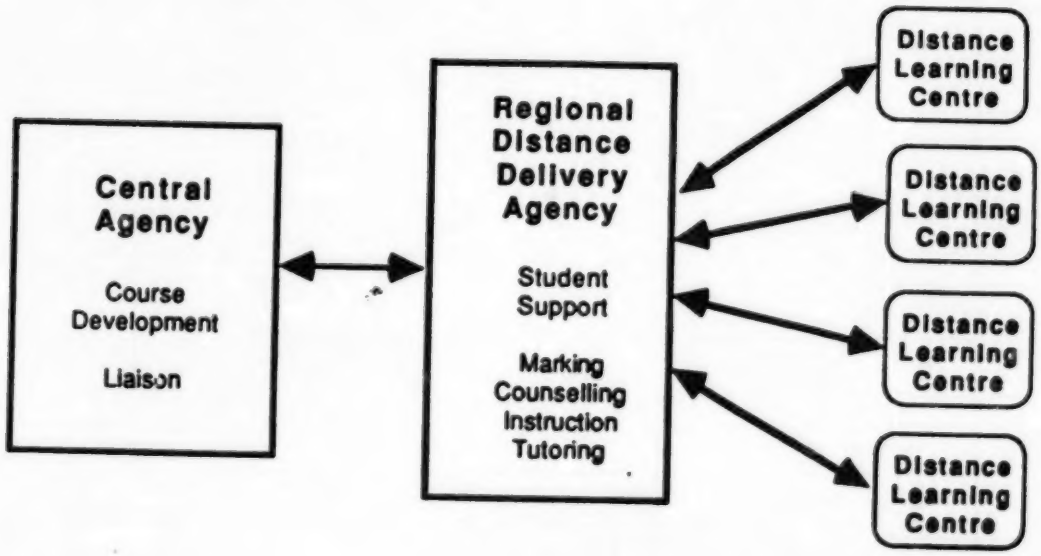
It should be noted that these improvements would not address the critical issues of equity, partnership, delivery, or support, and that their impact on turnaround time would be minimal, as the postal service would still be the primary delivery vehicle. In addition, the centralized approach will continue to impose financial constraints on ACS. Student enrollments have increased by almost 50 percent over the last three years. If they continue to increase, ACS will have difficulty maintaining, let alone enhancing, its services in the current economic climate.

The Decentralized Model

The second alternative is a decentralized operational mode. If the critical issues identified earlier (e.g., improved turnaround time, student support, partnership, equity, etc.) are to be addressed effectively, an attractive alternative is to marshall the educational resources that already exist on a regional basis. Alberta currently has some 1,500 schools and 30,000 teachers throughout the Province providing educational services to approximately 420,000 students. These resources should be considered as part of the solution to the problem of meeting the needs of distance learning students.

Fundamental to the concept of a decentralized distance delivery operation is the assumption that instructional resources and sufficient student numbers exist on a regional basis, if not in any particular community or school. It then makes sense to establish a regional delivery system which provides instruction, tutoring, counselling support and marking, and uses the technologies to link students to these resources. Diagrammatically, this might appear as follows:

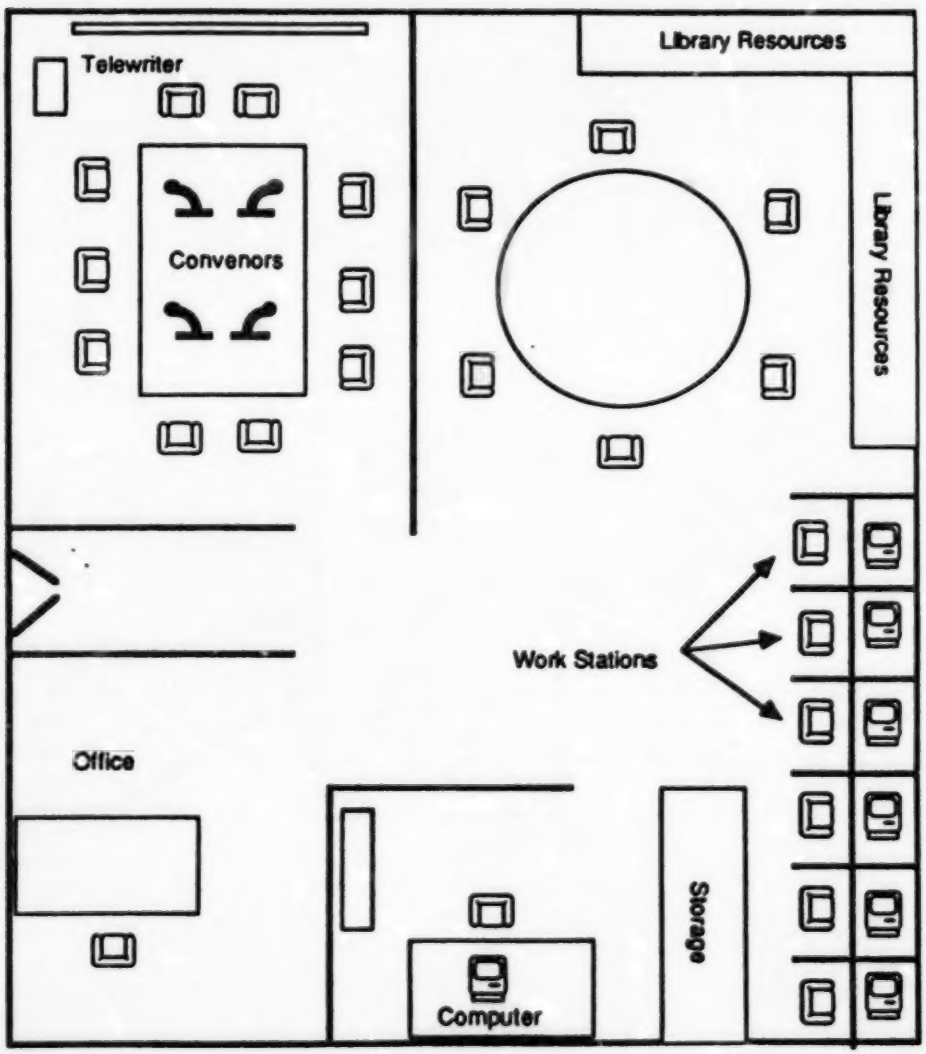
FIGURE 6: DECENTRALIZED CONCEPT



Schools within a region may wish to convert unused classroom or library space into a distance learning centre for both in-school and adult students in the community. An existing classroom could be converted to the Distance Learning Centre with very little modification. Existing resources within the school such as computers, carrels, movable walls, tables, chairs and a VCR/television could be utilized. The only additional technologies required would be convenors for audio teleconferencing, possibly a telewriter for graphics communications during the teleconferencing sessions and a modem for computer communications to the Regional Centre or the Alberta Correspondence School. Since the use of toll-free communication on the RITE system requires connection to a RITE switchboard, where possible, each of the learning centres could request such a telephone connection. In addition, library resources required for the courses would be available for both in-school and adult students.

Diagrammatically, the Distance Learning Centre might appear as follows:

FIGURE 7: DISTANCE LEARNING CENTRE



With this distance learning arrangement, students could have access to regional resources for instruction and assessment in two ways. For courses which have sufficient numbers of students within a region, but not within any specific school, direct instruction could be provided through the teleconferencing/telewriting system on a regional basis.

In those cases where instructional delivery within a region is not possible, both in-school and adult students could continue with the ACS-developed courses, but with access to additional learning resources. Qualified instructional/support resources could be assigned to these students on a regional basis. The role of the learning centre then would be to act as an access point for both the student and tutor. Library resources associated with the ACS courses could be made available to the student at the learning site. Additionally, video resources, if necessary, could be sent via satellite and recorded in the early hours of the morning via the proposed ACCESS "Night Owl" service. An additional benefit of this learning centre approach is that, in the evening hours when most of the adult students are available, the teleconferencing facilities could be used for access to correspondence or post-secondary courses available throughout the Province.

An Australian report[76] on support systems in distance education strongly advocates the establishment of learning centres:

> Referring to the Open University system, Sewart (1975) notes that the conventional tutorial has been replaced by the use of television, radio and written correspondence; directed reading has been replaced by specially designed course units; and the study centre has become a base for student interaction.
>
> There is one other significant, and more important change in distance education which should be mentioned: the increasing emphasis on the student learning at a distance, rather than the institution teaching at a distance. Because of this, individual support services have become an integral part of an effective distance education system.

Two major financial implications of the decentralized approach are the costs associated with establishing and staffing the learning centres, and paying for the instructional or tutorial services provided regionally.

It is assumed that vacant space, computer technology, a VCR/television and furnishings are already available within the school. Additional funds may be required for teleconferencing/telewriting facilities and a modem for computer communications. A typical centre cost for these technologies would be approximately $10,000 per centre. Staffing of the centres might be undertaken in a number of ways. One approach would be to link learning centres with the school library, adding centre coordination to their staff responsibilities. This approach might also increase the chances of retaining and enhancing library services in times of restraint. In the evenings, where appropriate, the centre might be staffed by the local Further Education Coordinator. Preliminary

discussions with Adult Learning Support personnel in Advanced Education indicate that these services might be offered in exchange for access to the facility.

Summary And Conclusions

Table 11 summarizes the alternatives for both the centralized and the decentralized approach to the critical issues.

TABLE 11: STRUCTURAL RESPONSE TO THE ISSUES

Issues	Centralized Model	Decentralized Model
Turnaround Time	Electronic marking, but this will have minimal effect.	Provision of marking at a location close to student.
Course Delivery	Continued reliance on the postal service to deliver lessons and limited resource materials.	Delivery of instruction on a regional basis as well as local availability of learning resources. Technology can be more easily and cheaply used because of shorter distances.
Student Support	Continued reliance on limited telephone contact.	Availability of local tutoring and counselling. Increased possibility for student-to-instructor and student-to-student contact.
Course Design	Best done centrally.	Better-suited to course delivery than to design. However, regional delivery will allow greater use of media resources.
Partnership	Limited partnerships with school systems and with the post-secondary institutions.	Extensive partnership with school systems and with the post-secondary sector.
Equity	Provides instruction for individual students, but does not support the instructional programs of the school systems.	Allows small or remote school systems to broaden their program offerings in a cost-effective way.

There is little doubt that the decentralized approach is a significant departure from the existing operation of the Alberta Correspondence School. As with other decentralizing initiatives of the Department, such as the Management Finance Plan, there would be a shift of the primary educational delivery responsibilities to the jurisdictions. Use of a regional system would encourage a sense of ownership in the provision of instruction and student support services. This approach effectively reduces turnaround time and improves student support and course delivery while addressing the partnership and equity issues identified earlier in this chapter. The primary role of the Alberta Correspondence School would be course development and liaison with the regional distance learning centres.

Technology can be used to develop centralized or decentralized systems. In our examination of the issues, a decentralized model seems preferable because it appears to have a strong potential for developing a sense of ownership and participation. It is this sense of ownership and participation that can contribute in very powerful ways to the improvement of status, quality and effectiveness of distance education. For the in-school student this local support should take human form. For the adult student, there may well be a greater reliance on technological communication; however, here again there is evidence that human interaction can provide an excellent source of support. After all, one of the prime motivations in seeking lifelong learning opportunities is the desire to socialize with others.

Technology can also offer a diversity of systems that meet the diverse needs of the distant learners who together comprise the total audience. Some courses will make very extensive use of computer-assisted learning techniques, and others will rely more heavily on some form of human communication; either face-to-face or through teleconferencing.

Careful study of the issues is a necessary first step in designing systems to meet the needs of the twenty-first century.

The end result of this planning should be a system that is effective and efficient; that recognizes diversity; and above all, meets the learning needs of Albertans and provides improved opportunity for equitable access to the learning programs of the future.

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